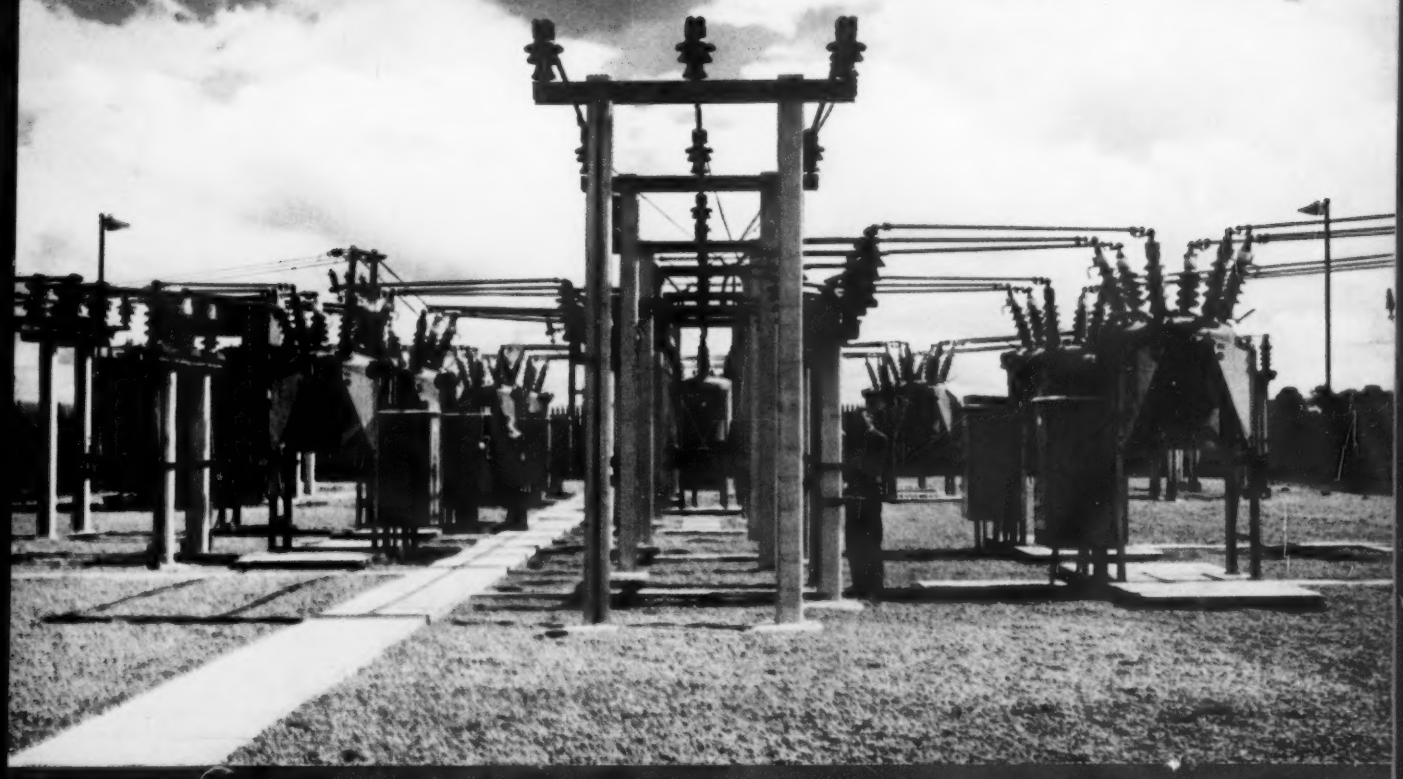
23 JUNE 1960

ONE SHILLING AND SIXPENCE

# ELECTRICAL TIMES



33 kV Single Tank Outdoor Oil Circuit-Breakers

*Nine 'ENGLISH ELECTRIC' 33 kV single tank oil circuit-breakers, type OKM4 in the Oswestry 33 kV Grid Substation of the Merseyside and North Wales Electricity Board.*

'ENGLISH ELECTRIC' manufacture single tank oil circuit-breakers with voltage ratings up to 69 kV. The range includes the OKM5 breaker for 33/46 kV with current ratings up to 2000 amp and breaking capacities of 1000 and 1500 MVA and is suitable for controlling 90 MVA and 100 MVA grid transformers.

## 'ENGLISH ELECTRIC'

THE ENGLISH ELECTRIC COMPANY LIMITED, MARCONI HOUSE, STRAND, LONDON, W.C.2

*Switchgear Department, Stafford*

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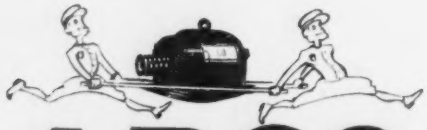

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**RE-WINDING AND COMPLETE RE-BUILDING** is carried out by the most advanced and efficient methods for all electrical machines from multi-speed motors to the largest and heaviest industrial generators and electrical equipment.
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Ottermill Trunking means:

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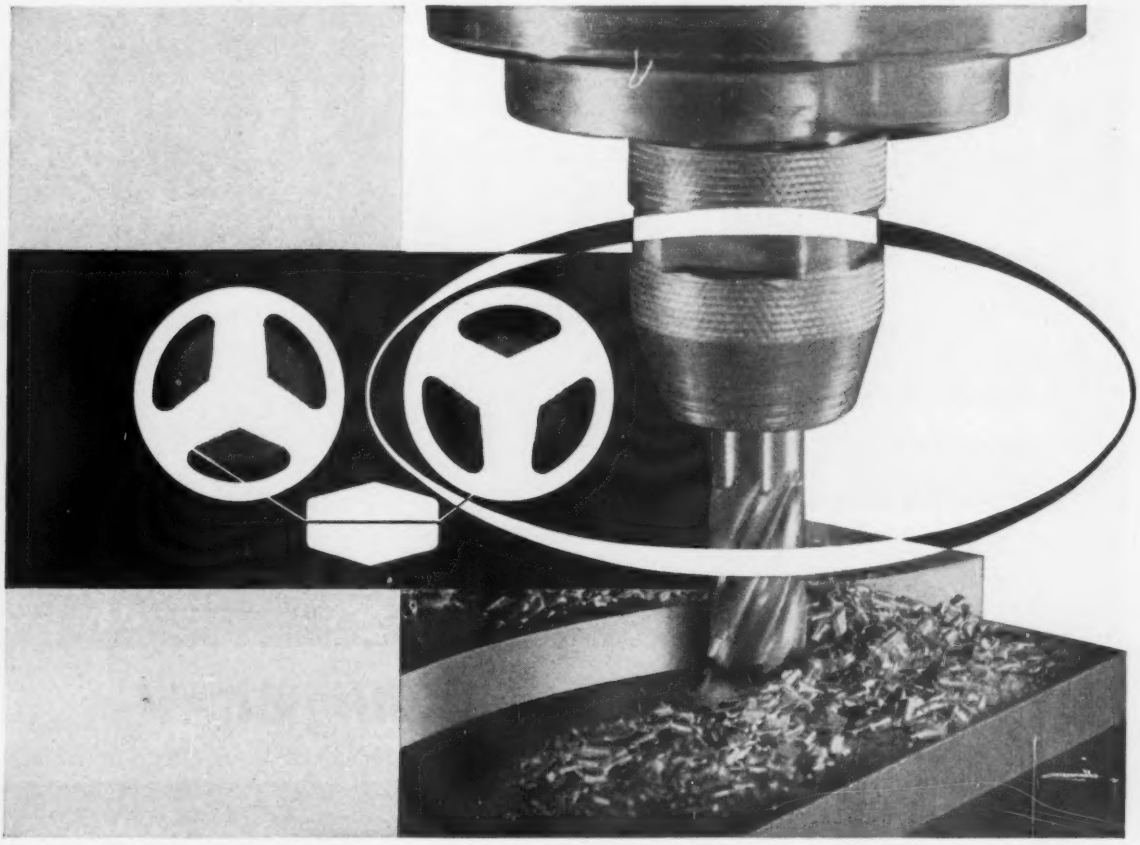

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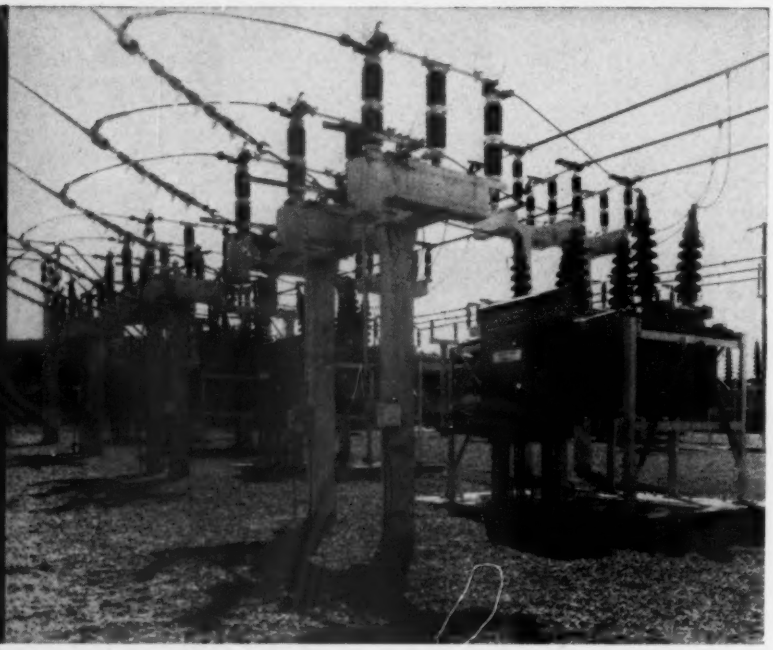

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*Prices of the entire family of over 150 Atlas Atlantic fluorescent fittings are down, some by as much as 8%!*
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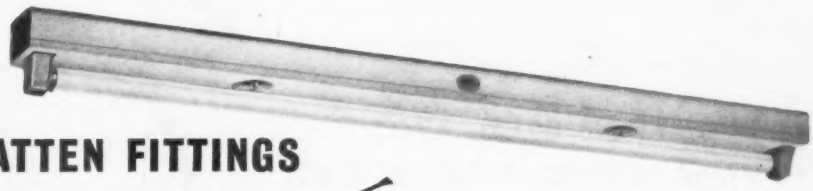

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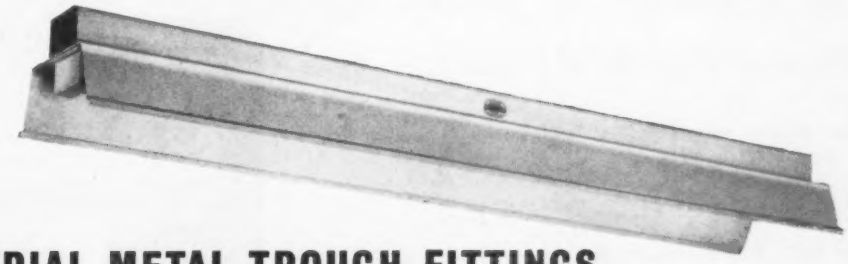

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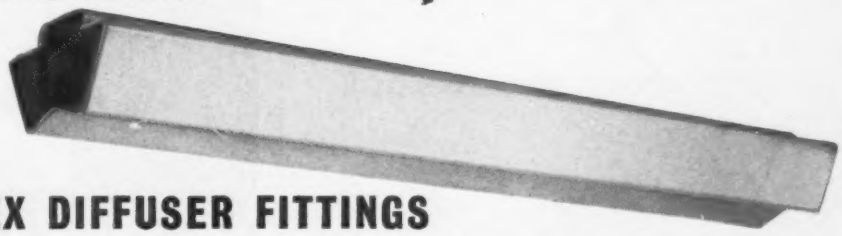

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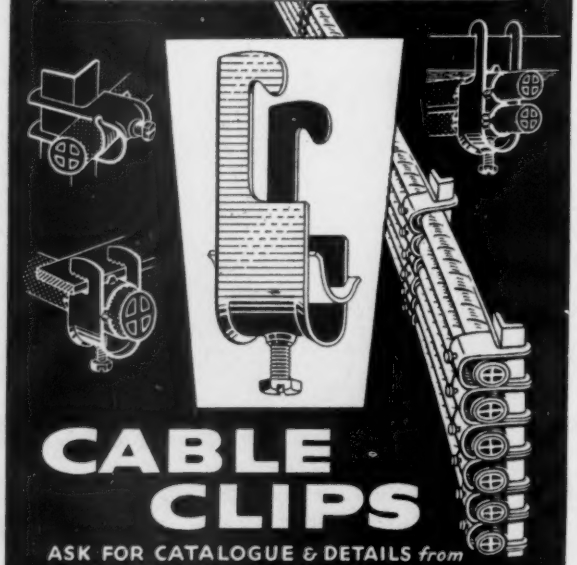

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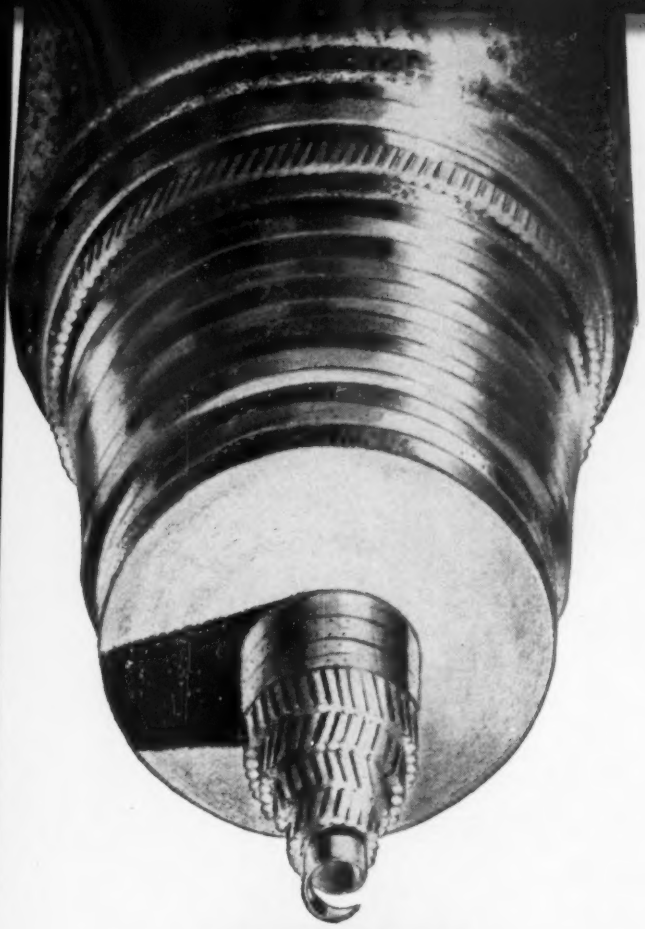


Ascending a 540 foot vertical shaft in the rock, twelve single-core 330,000 volt oil-filled cables link the Kariba power station with the transmission lines above.

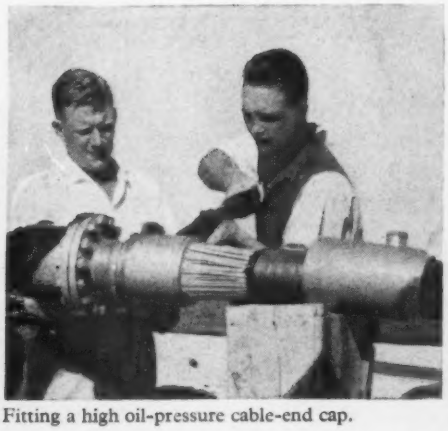
To overcome installation difficulties each cable was produced in a continuous un-jointed length, the longest being 665 yards. Total length of 330,000 volt cable supplied —6,718 yards.

These cables, operating at the highest voltage in Africa, were designed, manufactured and installed by the BICC Group.

*The Electrical and Mechanical Consulting Engineers: Messrs. Merz & McLellan.*

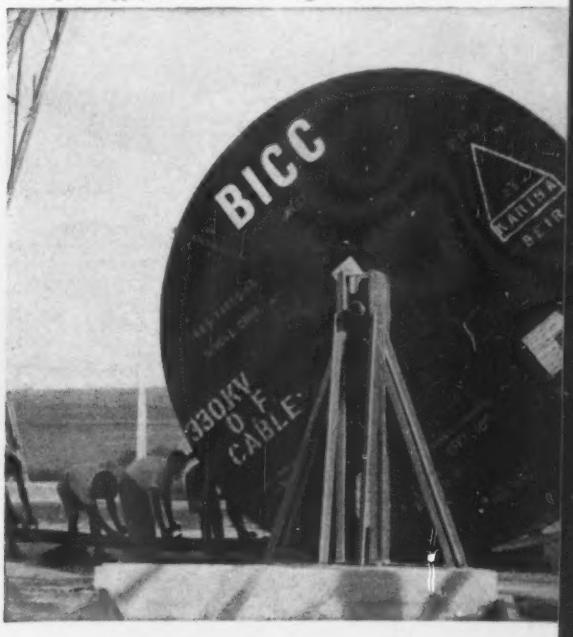
# BICC 330,000 VOLT CABLES AT KARIBA

Installing a 330,000 volt cable termination.
*(Copyright: Federal Power Board)*



Fitting a high oil-pressure cable-end cap.

A length of 330,000 volt cable being drawn off the drum.

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## can do everything but walk—

***YET IT TAKES EVERY JOB IN ITS STRIDE!***

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*For optional or single coin use*

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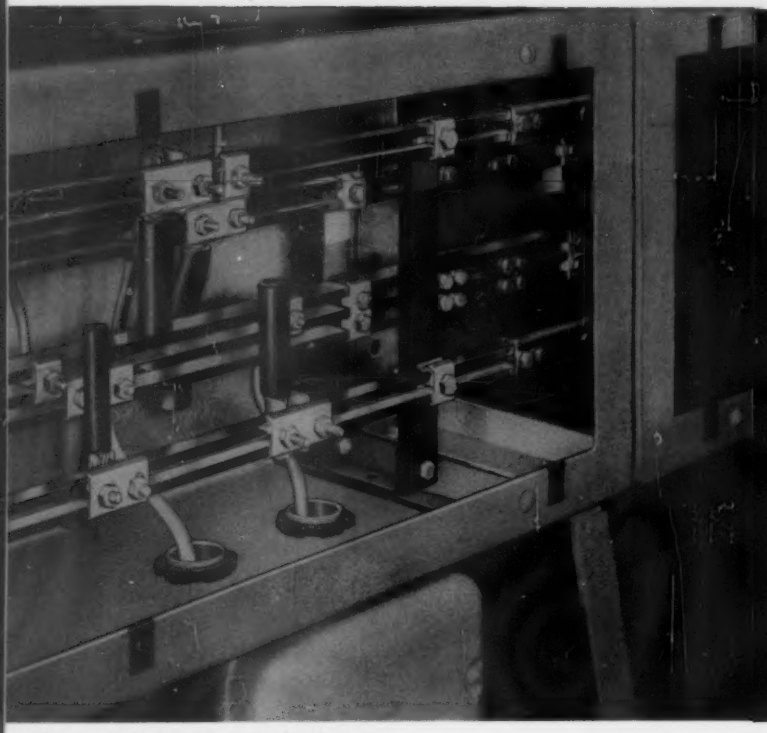
# Simplex Star

## BUSBAR CHAMBERS WITH STAR FEATURES



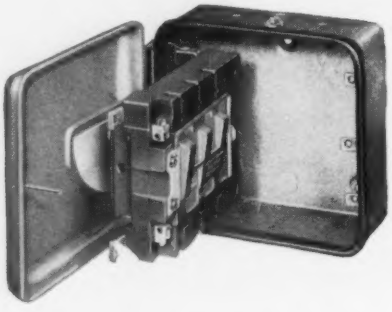
- ★ Smart and modern in appearance.
- ★ Simple and sound common-sense wiring facilities.
- ★ Phase indication.
- ★ Universal clamp connections that require no drilling and no sweating.
- ★ Maximum adaptability of stand assemblies, length of chamber, and polarity.
- ★ Detachable busbar supports that can be repositioned to suit incoming and outgoing feeds.

Send or 'phone for fully descriptive leaflet.

Close up of interior of Star Busbar Chamber showing busbar arrangement, and main and branch terminals. Cables, deliberately cut away for purpose of illustration, are ·15 and ·3 sq. in. sizes.

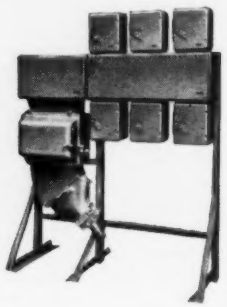
**The new Simplex Star range of switchgear has already become big-news. Here is an example of advanced thinking, of improved design and modern methods that add a plus to every feature yet a minus to the price.**

S.3



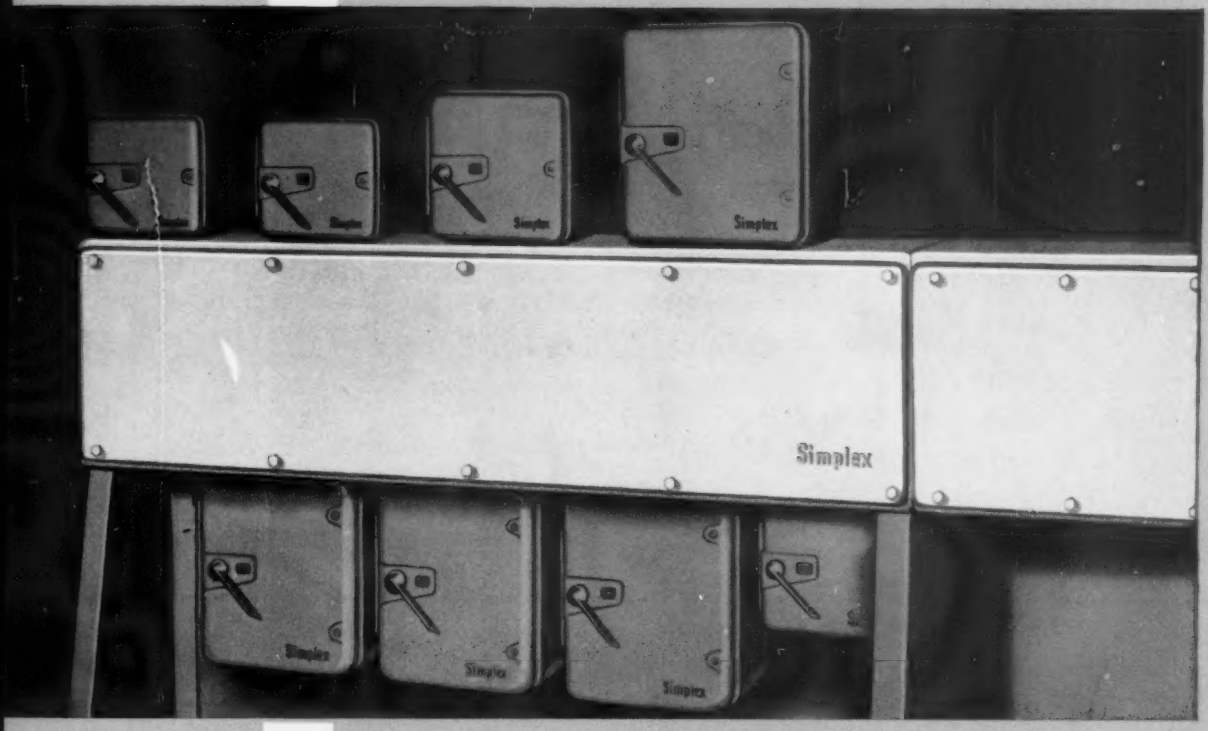
*Star switchfuse with cover open showing interior hinged forward for ease of wiring.*

*Star distribution fuseboard.*



*Star switchboard—A team of Simplex practical experts will help you with designing building and advice on complete Simplex switchboard installations.*

# Busbar Chambers from this brilliant new range of dead-front switchgear with everything plus but the price




**The Simplex Star range, simpler, smarter, more easily serviced, is a wide practical range, covering industrial and commercial applications or requirements. Wiring and assembly instructions are enclosed with all units together with list of spares.**

**SIMPLEX ELECTRIC COMPANY LIMITED**

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We have been making thermocouple alloys at Cheadle for many years. Our experience tells us what people look for and our alloys provide it—stability, constant EMF values and long life.
Different temperature ranges call for different alloy combinations—and we provide them, including 'T1/T2', the only British-made base metal thermocouple for temperatures up to 1100°C. In cases where thermocouple wires are covered by a British Standard we produce them to conform to the Standard.
Accurate temperature measurement and control is something that cannot be left to chance. It is best left to Driver-Harris thermocouple alloys.

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**T1/T2** are wires of the nickel-chromium/nickel-aluminium type for use at high temperatures and conform to the British Standard Specification 1827: 1952 within the usual tolerances. They also meet the requirements laid down in Air Ministry Specifications 1632 and 1705 covering extension leads.
**Special Advance*** wire (60/40 copper-nickel) is for use with copper up to 400°C and with iron up to 900°C. The EMF requirements of these two combinations vary according to individual specifications.

*If you are interested in thermocouple alloys, then you may like to have a copy of Data Sheet No. 2 for reference.*

Special Advance* wires can be selected in most cases to meet these varying demands within the usual tolerances.
**Matched Advance* Iron Wires** The non-availability of a Standard Iron and the variation of EMF properties experienced with different iron supplies result in some difficulty in reproducing thermocouple EMF properties. To overcome this difficulty we are now able to provide a Special Iron wire matched with Special Advance* to meet certain standard EMF requirements within the normal tolerances.

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**Cheadle Heath, Stockport, Cheshire**

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## 9.30 am–6 pm
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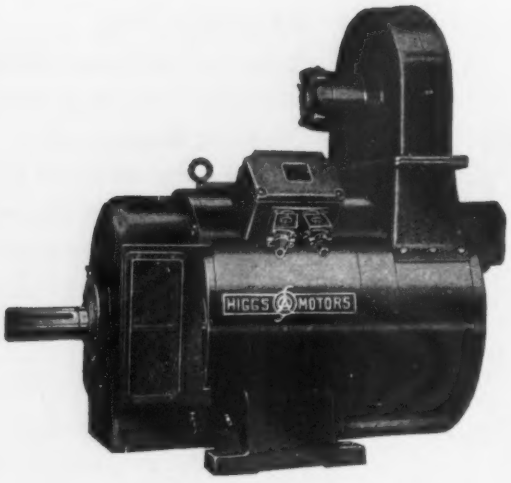


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## a completely new range of
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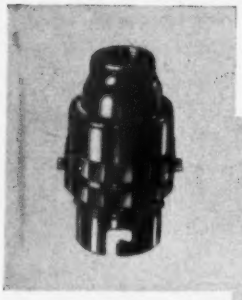
**TO THE *NEW* SUPPLEMENT No. I. (1959) B.S.S. 52—1952**



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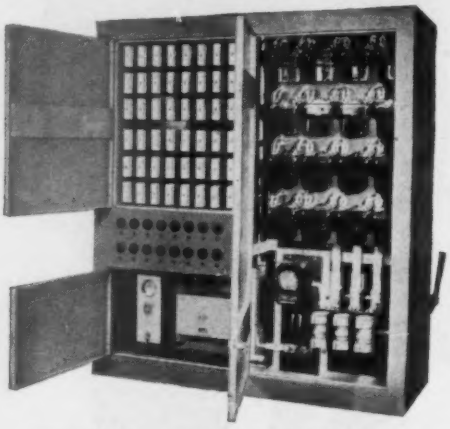
*built to individual Specifications*



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With the special off-peak tariffs now available through the electricity authorities the overall costs of thermal storage space heating has been reduced to a most economical figure. We are specialists in the design and manufacture of automatic panels for space heating control and have supplied panels handling up to 500 kW.

The panel illustrated handles 267 kW and is divided into 16 zones with individual limit thermostats and overall control by time-switch, together with anticipatory control unit. We shall be most happy to quote for your automatic control panel.

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Comprehensive range of contactors for all types of thermal storage and space heating control—10 to 350 amp. SINGLE, DOUBLE, TRIPLE AND FOUR POLE.

FOR SILENT OPERATION. All models can be fitted with D.C. operating coil and rectifier.

*Type D10 60. 4-Pole, 60-Amp, in steel housing.*

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# efficient... versatile... economical...

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## adjustable cable saddles

Both the AS two-screw saddles and the SAS single-screw saddles, fulfil every requirement for cable security, time saving in assembly and reduction in installation costs wherever electrical wiring is required.

They combine immense strength and high insulation value with freedom from corrosion and electrolytic action—and will accommodate cables in every combination for both direct-to-wall and in conjunction with standard slotted cable racking.

### Look at these advantages

- Save time
- Increase efficiency
- Greater versatility
- Made from immensely strong nylon.
- Lighter and stronger than metal.
- Absolutely anti-corrosive.
- Self-tensioning straps.
- No need to carry large stocks of components

TYPE **as**

**2 POINT 2 SCREW FIXING**

The quickest, most convenient, most versatile and economical Cable securing method yet available.

Designed specially for wall and panel mounted wiring installations, the AS Cable Saddle will accommodate cables of any diameter, type or combination, providing complete security with the highest insulation and anti-corrosive qualities in any climatic conditions.

Only 3 sizes are required to cover the most complex cable assembly.

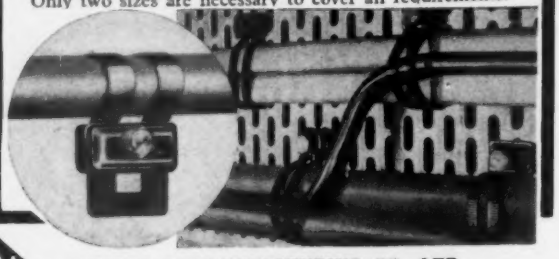
TYPE **sas**

**TWO POINT SINGLE SCREW FIXING**

Developed from type AS above, but specially adapted for use with standard cable racking.

The type SAS Cable Saddles will efficiently secure with a single screw, cables of any diameter or diameters in even less time than ever before.

Only two sizes are necessary to cover all requirements.



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*The Stator of a heavy duty motor being wound with Lewkanex in the works of Baldwin & Francis Ltd., Sheffield.*

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## *THE* high temperature WINDING WIRE

The introduction of the polyester type of covering has the particular advantage of exceptional thermal stability. The enamel film on Lewkanex wires is based on a terephthalate polyester and thus combines improved heat-ageing qualities and has a useful life at much higher temperatures.

Lewkanex wires meet all the requirements of B.S.1844 and are offered in the size range 0·004″ to 0·080″.

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# 33 kV
METALCLAD
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*combining*

**OUTDOOR ECONOMY**

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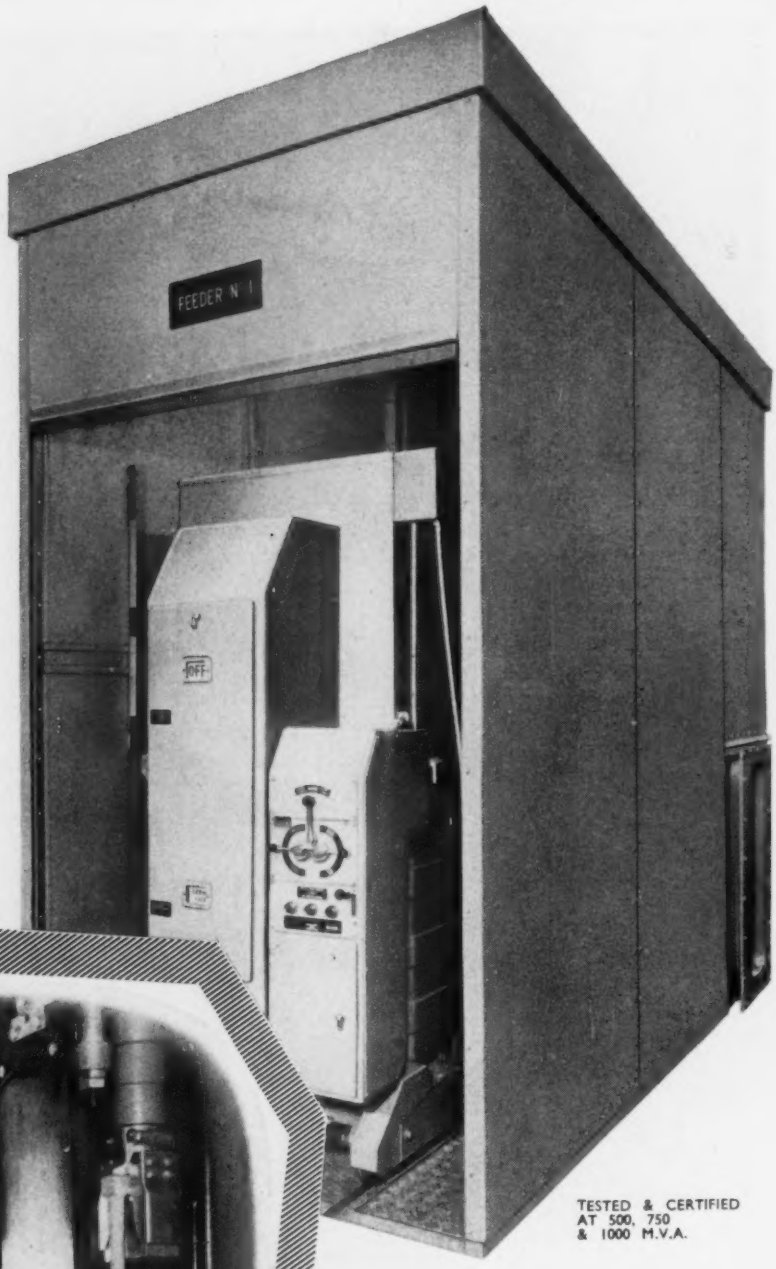


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AT 500, 750
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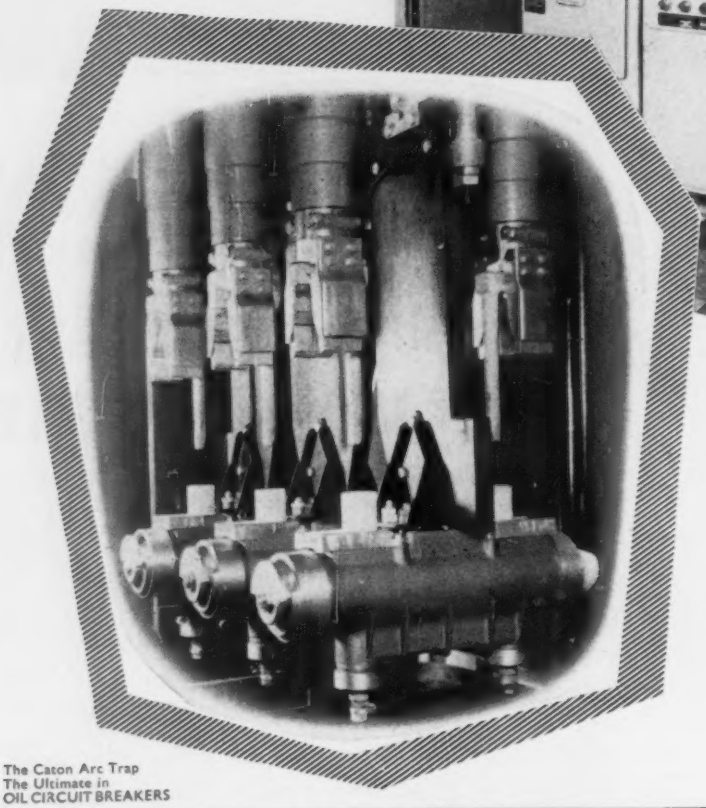

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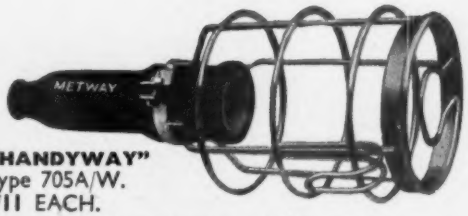
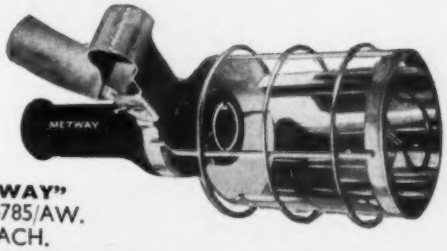
- PLATED GUARDS




**"HANDYWAY"**
Type 705A/W.
**8/11** EACH.
Type 2705/AWS with switch. **11/11** each.




**"GRIPWAY"**
Type 4785/AW.
**14/8** EACH.

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| Type 2682/PH Plastic diffuser | 40 watts **10/6** each |
| Type 2650/PH With glass | 60 watts **9/8** each |
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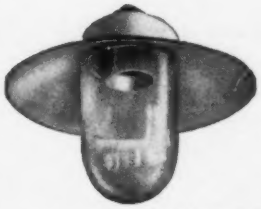
**"LIGHTERWAY"**
**WELL GLASS FITTINGS**
With porcelain tops tapped ¾" conduit

| | | |
|---|---|---|
| Type 917 PH | 60 watt | **12/4** |
| Type 918 PH | 100 watt | **17/8** |



**WITH REFLECTOR**
Type 918/5647
60 watt **16/8**
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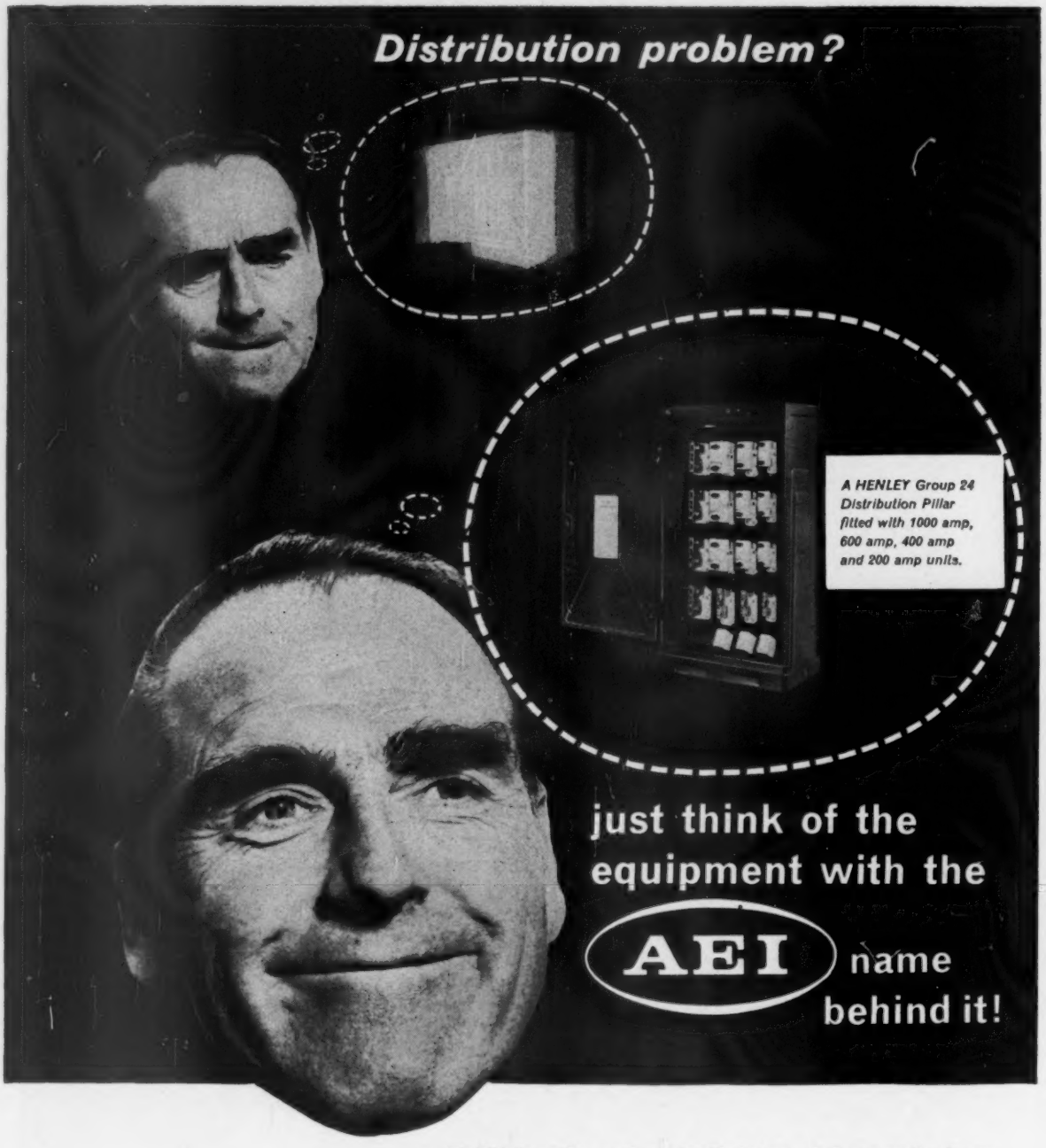


just think of the equipment with the AEI name behind it!

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**DISTRIBUTION EQUIPMENT SALES DEPARTMENT**

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# NEWS SHEET

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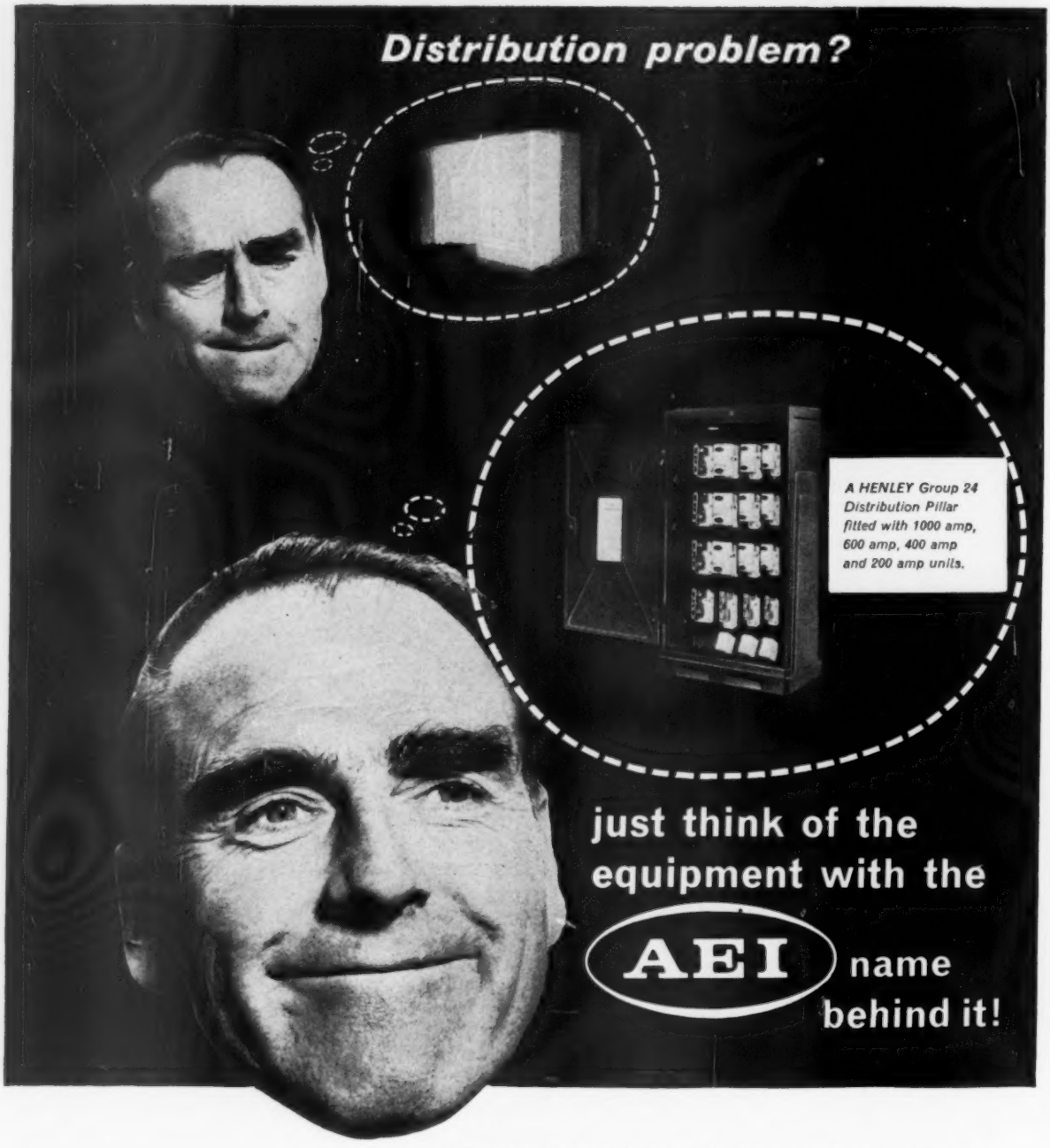
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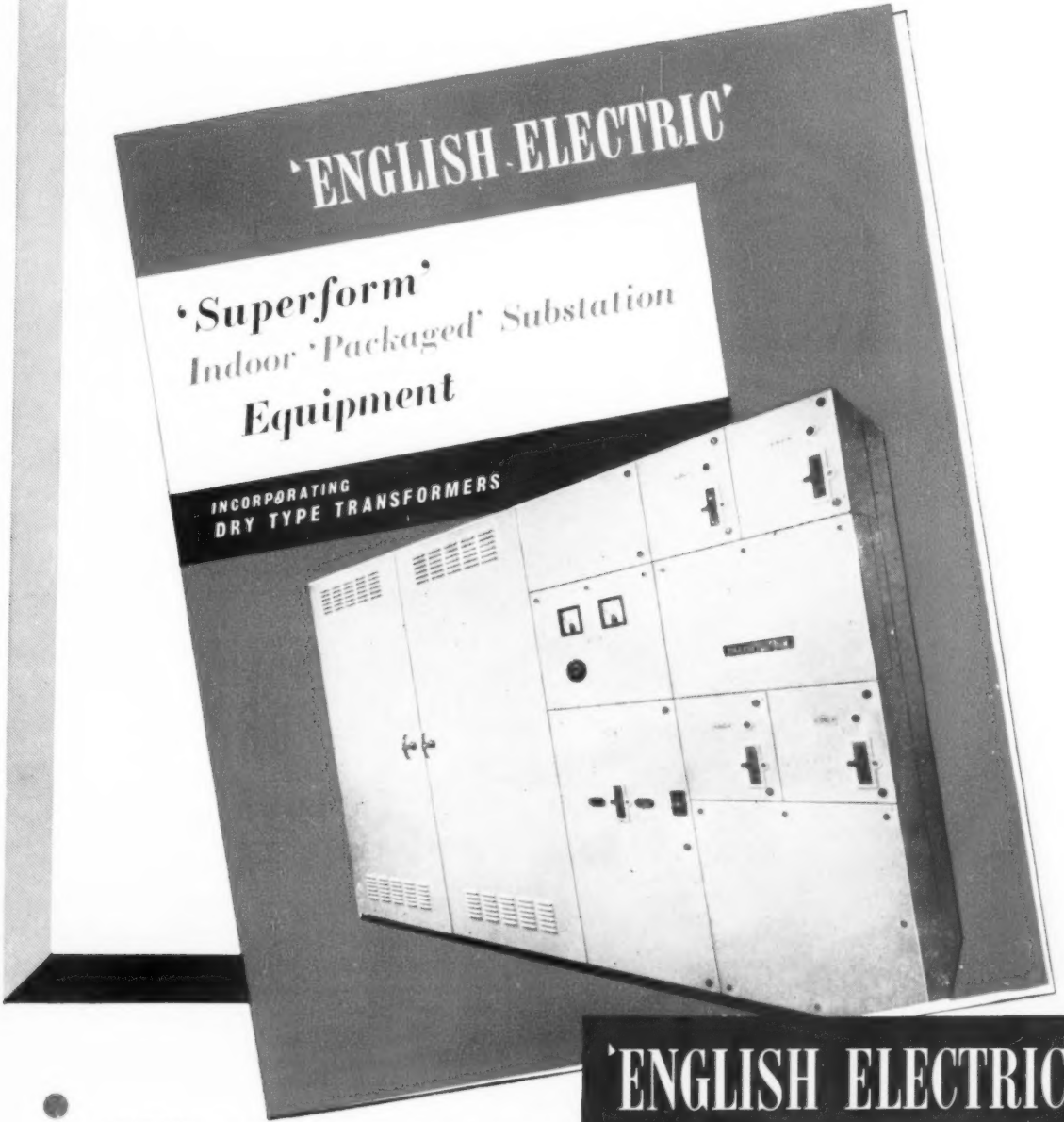


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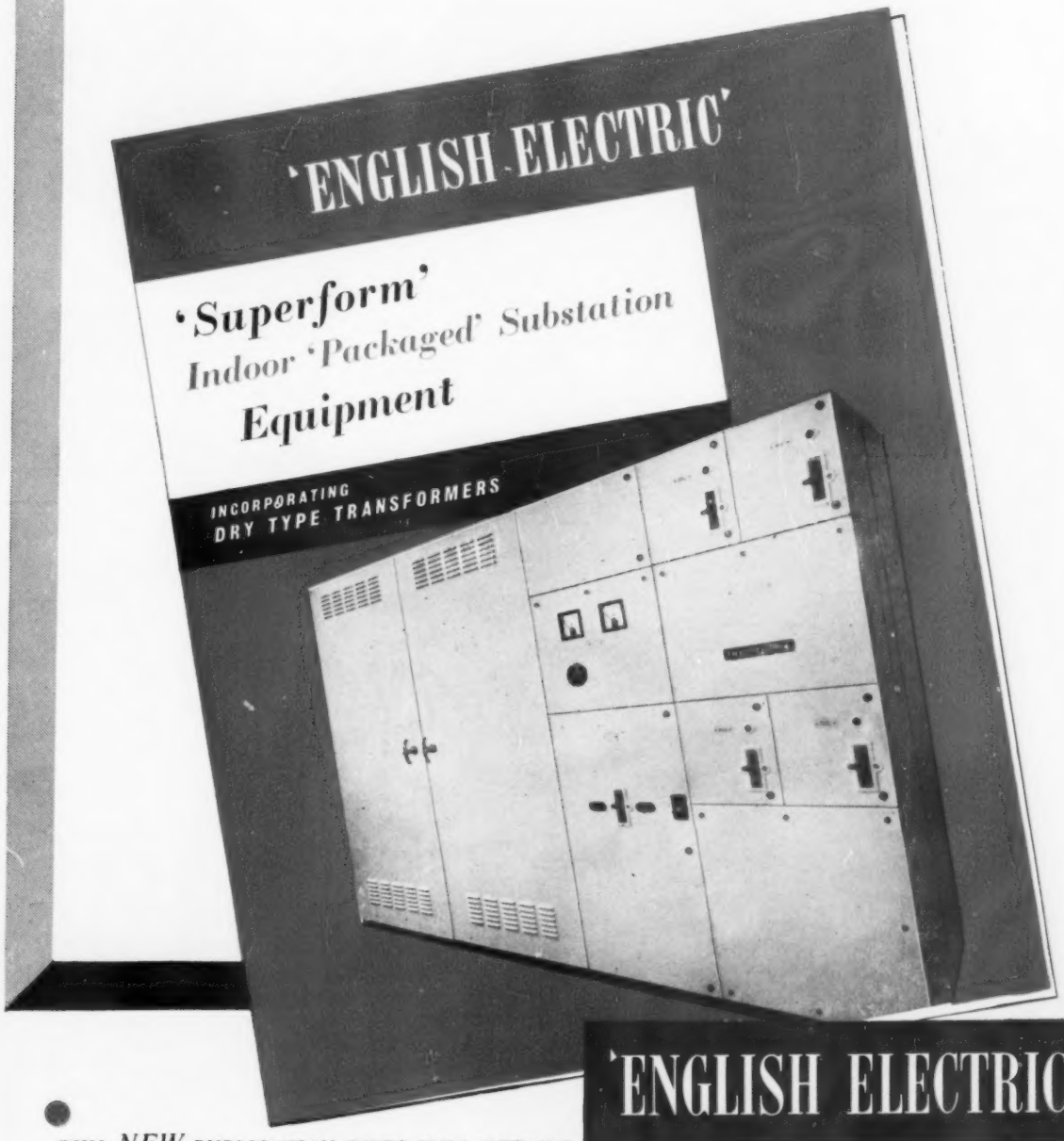


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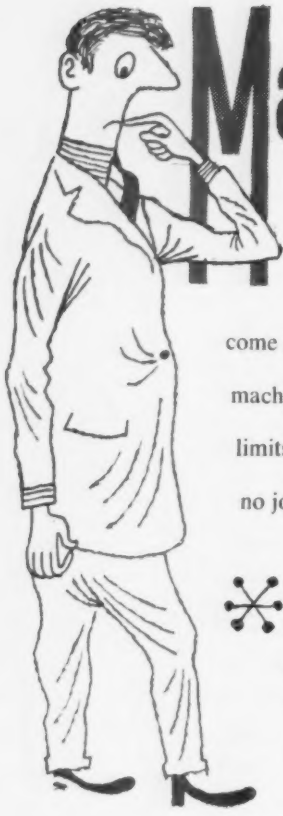

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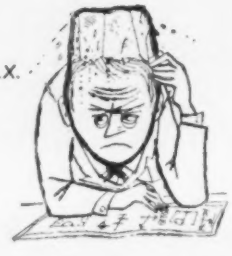

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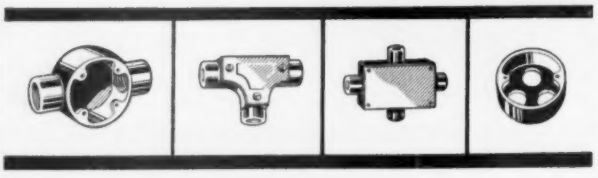

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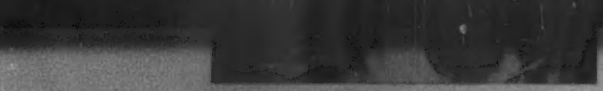

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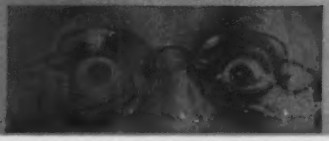

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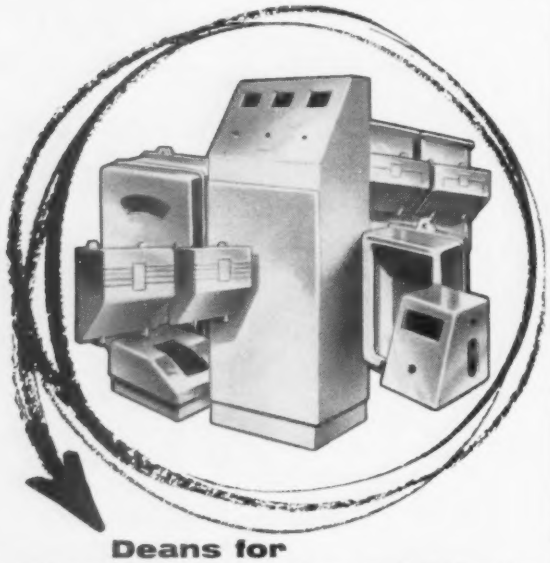

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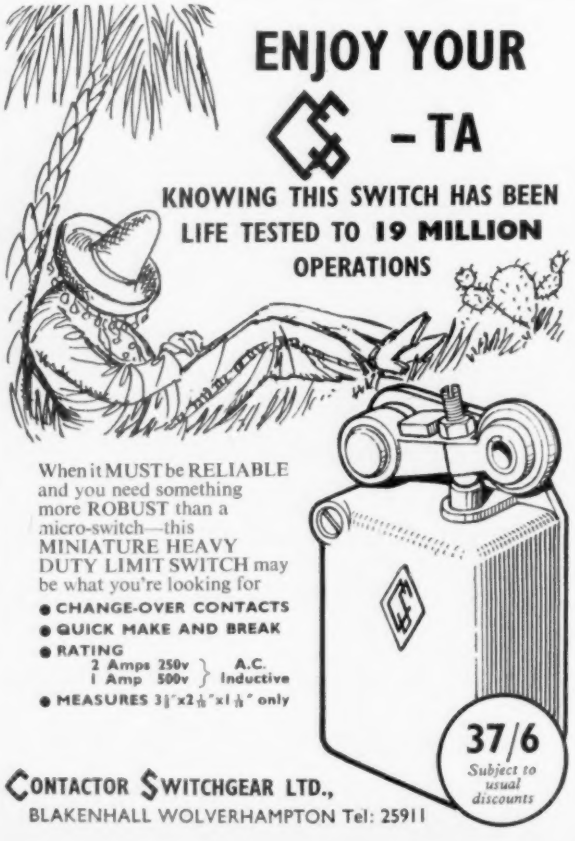


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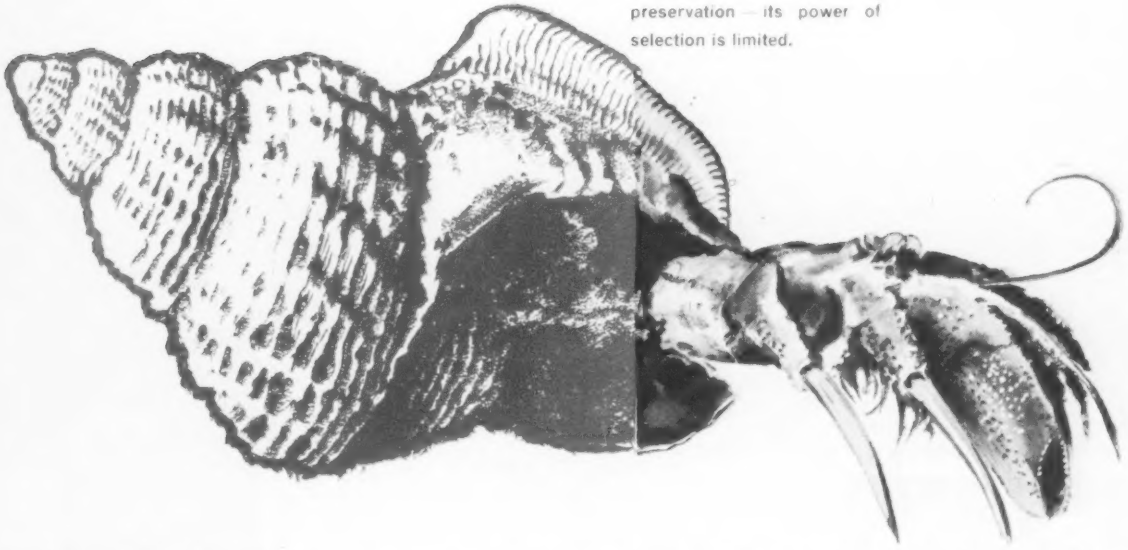

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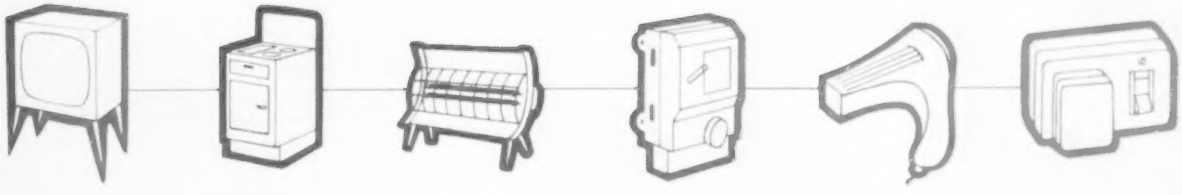

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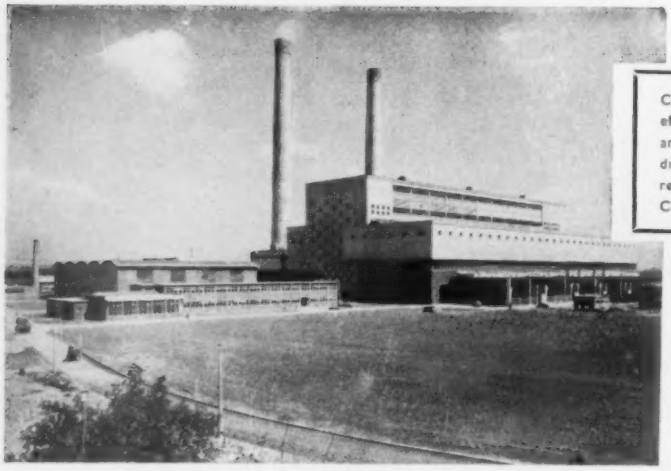

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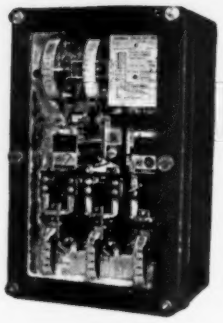

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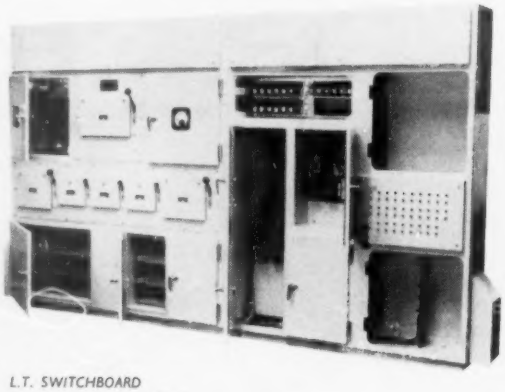

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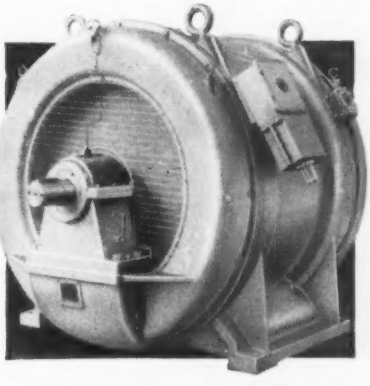

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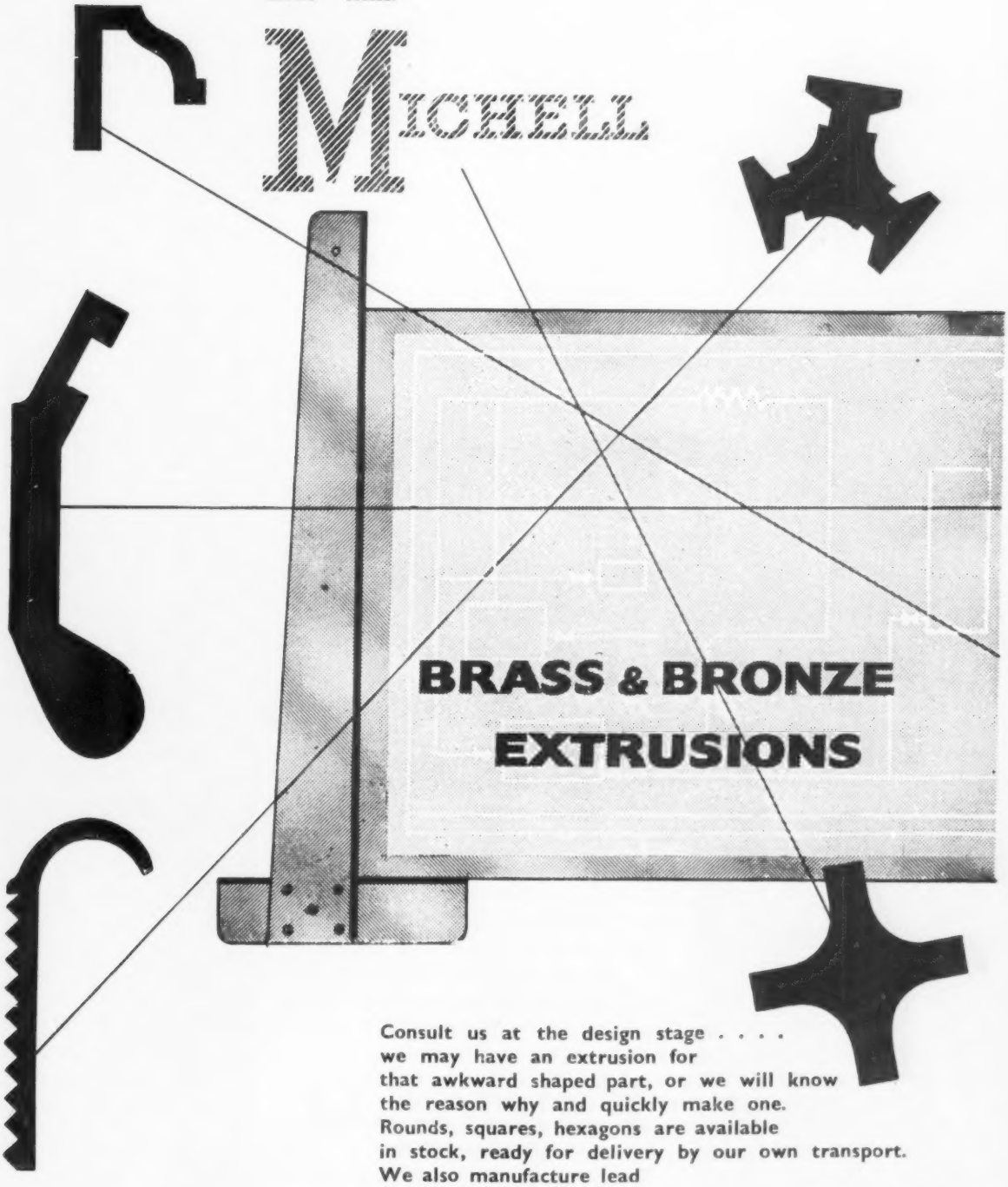


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THURSDAY 23 JUNE, 1960
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# ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
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### *Dans ce numéro*

**Enroulements en Lamelles d'Aluminium** ... ... 999
On peut utiliser des lamelles d'aluminium pour remplacer le fil de cuivre rond dans la fabrications es enroulements. On enroule les lamelles épaisseur sur épaisseur, la largeur de la lamelle étant égale à celle de l'enroulement. L'amélioration des caractéristiques thermiques permet de réduire l'isolement, et d'obtenir un meilleur coefficient d'encombrement. On peut anodiser l'aluminium pour obtenir un isolement haute température. Il existe une gamme de bornes variées, et une méthode simple a été mise au point pour réadapter les enroulements actuels et passer du fil de cuivre à la lamelle d'aluminium.

**Essais réalisés avec des Appareils de Chauffage à Accumulation** ... ... ... ... ... 1007
On a effectués des essais de chauffage de bâtiments commerciaux avec le chauffage central au gaz, des chaudières à charbon, et le chauffage électrique à action directe pour une saison; et au cours de la suivante avec des appareils de chauffage électriques à accumulation de chaleur. Etant donnés les prix actuels des combustibles en Grande-Bretagne, les appareils de chauffage à accumulation sont competifs avec toute autre méthode de chauffage des bâtiments commerciaux.

**Conférence des Grands Réseaux Electriques** ... 1019
Les séances de la Conférence sur les grands ensembles de production d'électricité, qui s'est tenue à Paris (CIGRE), a revelé l'interêt manifesté pour un isolateur hélicoïdal destiné aux lignes aériennes, et pour les travaux russes sur une ligne de transport pour courant continu à 800 kV. La méthode russe en ce qui concerne les fils de terre protégeant les lignes aériennes, consiste à adopter un angle de protection de 30°. Dans les séances consacrées à la stabilité des systèmes, l'interêt s'est porté sur les instruments limitant l'angle de rotor des générateurs.

### *In dieser Nummer*

**Aluminiumbandwicklungen** ... ... ... ... 999
Aluminiumstreifen lassen sich anstelle von Kupferrunddraht zum Spulenwickeln verwenden. Hierzu wird ein Wickelstraifen von einer Breite gewählt, die der vollen bewickelten Spulenlänge gleicht. Der Streifen wird dann Lage um Lage aufgewickelt, wobei der Isolationsmaterialbedarf reduiziert, das thermische Verhalten der Spule verbessert und ein günstigerer Wicklungsfaktor als bisher erzielt wird. Durch vorherige Eloxierung des Aluminiumstreifens lässt sich eine besonders hitzebeständige Isolierung herstellen. Für die Anschlussverbindungen sind mehrere Lösungen ausgearbeitet worden und für den Umbau bestehender drahtbewickelter Spulen auf Aluminiumbandwicklung gelang es, einen sehr einfachen Vorgang zu entwickeln.

**Versuche mit Blockspeicherheizungen** ... ... 1007
Versuche wurden Angestellt mit der Beheizung von Bürogebäuden während einer Heizperiode mit Zentralheizungen mit Gasfeuerung, dann mit kohlengefeuerten Kesseln und schliesslich mit direktwirkender elektrischer Heizung und vergleichsweise während der nächsten Heizperiode mit elektrischen Blockspeicherheizungen. Bei dan gegenwärtigen Brennstoffpreisen in Grossbitannien erweisen sich die Blockheizungen als konkurrenzfähig gegenüber alle anderen bekannnten Heizungsarten für Bürogebäude.

**Grosskraftnetz-Konferenz** ... ... ... ... 1019
Auf der in Paris tagenden Grosskraftnetz-Konferenz (CIGRE) erregte ein für Freileitungen vorgeschlagener Schneckenisolator lebhaftes Interesse, ebenso die in Russland gemachte Erfahrung mit Energieleitungen für eine 800 kV Gleichstrombelastung. In bezug auf Edrungsleitungen zum Schutze von Freileitungen arbeitet man in Russland mit einem Schutzwinkel von 30°. Auf den Sitzungen, die sich mit Netzstabilisierung befassten, fanden Vorrichtungen zur Begrenzung des Läuferwinkels in Grossgeneratoranlagen merkliches Interesse.

**Aluminium Strip Windings** ... ... ... ... 999
*by B. H. J. Rata,* B.SC.(ENG.), A.C.G.I. *and J. S. Haggitt,* A.C.T.(BIRM.), GRADUATE I.E.E.

**Treating Electric Shock** ... ... ... ... ... 1002

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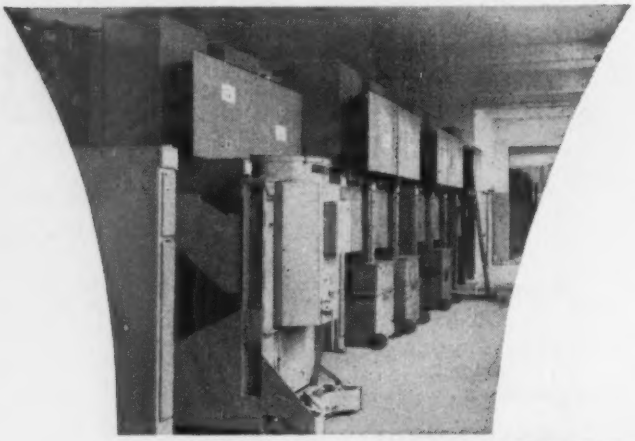
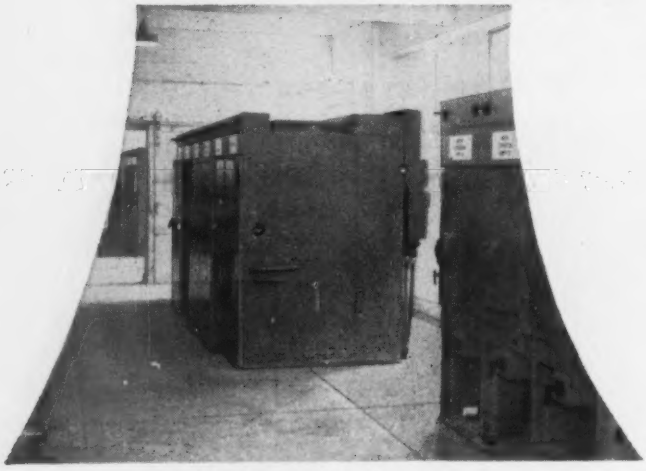


# POWER STATION SWITCHGEAR IN SOUTHERN RHODESIA



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# ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY, 23 JUNE, 1960

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K. C. POUNDS, B.Sc.(Eng.), A.C.G.I., A.M.I.E.E.

*News Editor*
T. W. WRIGHT


# Comment

## NUCLEAR PROGRAMME REACTION

Like credit restrictions, the nuclear plant programme has had several ups and downs and the White Paper published this week provides another. The contents, however, add little to the background of the nuclear plant picture as, for some considerable time, the leaders of the electrical industry have used every opportunity of explaining the go-slow on nuclear station building and the introduction of the one-station-a-year rate of ordering. The new target, if that is the right word for a constriction, is to be 5,000 MW of nuclear capacity by 1968. Of this, 1,875 MW is already under construction and a further 1,050 MW approved. This leaves some 2,000 MW of plant still to be planned, of which Oldbury will no doubt account for 550 MW. With Sizewell scheduled for 1965-66 and presumably Oldbury by 1966-67, this still leaves some 1,500 MW required to meet the programme. In his paper at the BEPC, Mr C. R. King suggested the probability that only one more Magnox station after Oldbury would be built, by then AGC reactors being available. This ties reasonably well with the statement by Sir Christopher Hinton at the press conference this week that the CEGB hope to order an advanced gas-cooled reactor within two years, but much depended on how quickly the necessary experimental information became available. On the question of generating costs, the White Paper is less optimistic than Sir Christopher's detailed study given before the World Power Conference; it suggests no more than that it will be cheaper to generate base load in nuclear stations by 1970.

## OFF-PEAK HEATING OR NO?

There will be general welcome for the mass of comparative statistics on thermal storage block heaters and other heating systems published by the Electricity Council last week. Although oil, the most competitive of fuels, was not included in the comparative tests, the results are not unsatisfactory in terms of electric block storage heating as a choice for office heating alternative to coal or gas. But probably the most interesting part of the results for the electrical engineer is the comparison with direct electrical heating in the form of electric fires and convectors. The comparison here is complicated by the understandable lavishness of electricity supply offices in their use of cost-price electrical energy. However, making allowances for this, it seems clear that direct-acting electric heating involves only about one-third of the capital cost of a thermal storage installation and takes only about half as much energy. What this implies in terms of costs to the consumer depends on the tariff in force. If it relates fixed charge or block size to floor area, direct

heating will look the better prospect; if to installed load, then block heaters may have the edge. The background to this situation must be sought in the load factor—relative to system peaks—imposed by electric fires and convectors. This may be as low as 20%. The question thrown up by such results is whether more incentive than at present for off-peak consumption is necessary. Direct-heating offers most of the important incidental advantages of electricity to the consumer, who is unconcerned with load curves. The industry has got to buy his support if they want off-peak supplies. It is no use pointing to complicated calculations to justify off-peak rates: the customer judges on his own costs not those of the seller.

## MIDLANDS WATER PIPES

Something of a storm has blown up in Staffordshire because a water board has called on the local electricity board and others concerned to stop earthing systems to water pipes. Just why this step has been taken is somewhat obscure; there is mention of "danger," but the obvious suggestion that there is extensive change-over to non-metallic pipes is said not to apply in the area involved. Some intricate questions arise from the "request" of the water board as they would from any other, and its action draws attention to the rather casual way in which the electricity industry takes for granted its practice of using this convenient safety precaution, at least where cable sheaths are not available for the return to substation neutral earth. The matter is given sanction by an agreement arrived at under Institution of Civil Engineers' auspices, which has been included in the IEE Regulations since 1950, but is older than that. That is a sensible arrangement, for whatever may be the arrangement formally about earthing to water pipes, fortuitous contact will be hard to avoid on every occasion and positive bonding provides the better answer. With an earthed water pipe so often providing a lower earth electrode resistance than any purpose-made installation, the pipe will become the main earth from the fault current-carrying aspect, whatever the water board may wish. That is the practical reality of the situation; for a water authority to attempt prohibition seems to be kicking against the pricks, galling though it may be to give for nothing a valuable facility to another enterprise. Their consolation is that it is all done in the interests of public safety.

## OUTLOOK FOR TRADING

Last week produced shock news on domestic appliance trading in the Hoover announcement about redundancy. Although other manufacturers have hurried to state that their situation is less serious, the Hoover experience tends to confirm the general impression that the Chancellor's h.p. restrictions have been effective in damping down sales—though the Electricity Council figures for April (before the h.p. restrictions applied) suggest that washing machine sales were falling relatively to 1959 in any case, quite apart from seasonal factors. The pause in the headlong expansion of domestic electrification in this country adds point to some of the opinions expressed in the papers and the presidential address to the ECA annual conference earlier this week. From Mr Stock, the retiring president, there came a call to maintain some degree of self-discipline within the industry now that the specific trade association sanctions have crumbled under the effect of the RTP Act. The prospective loss of the Electrical Fair Trading Council for the same reason is a heavy blow in this respect, and there will be general endorsement for Mr Stock's call to keep alive its principles; indeed, some means of keeping the Council in being, albeit in suspended animation, would be far preferable, for the need for the forum and guidance it provides seems certain to come again. Falling sales, with imported appliances in the hands of chain stores and wholesalers can too easily provide the price war conditions that the industry fears. Yet the opinion of the retailing expert amongst authors of papers at the conference remains, that the outlook is promising for the electrical retailer more than for most in that trade. Significantly, though, it is through co-operation and joint action for specialisation that he sees the highest hopes—otherwise the prize is likely to go to the big stores.

## ANSWER FOR FIBRILLATION

One of the effects of a severe electric shock is to send the victim's heart into a state of fibrillation. The normal pumping action is replaced by a quivering, incapable of pulsating blood round the system. It has long been known that a counter-shock can correct this condition, but for long this involved a surgical operation for certainty of effect and was feared to be an impracticable idea for first aid purposes. Now American work is suggesting that the matter may not be quite so hopeless. Relatively heavy machines have been built which will apply a suitable counter-shock through electrodes applied to the victim's skin; design work is proceeding on portable versions. But how to keep the patient alive until such a machine can be fetched? The safety margin in time is only about five minutes, probably less. The suggestion now is that external heart massage may be applied through direct pressing on the patient's chest and that this can keep enough blood circulating to prevent irreparable damage to the brain. Since artificial respiration needs to be practised at the same time, there are many difficulties—but the new approach does hold out hope of solving a problem which has previously seemed impossible of solution. But though research continues, the cardinal rule remains: get some sort of artificial respiration drill working as soon as possible, with the tongue cleared from the victim's wind pipe.

Meteor

*This week's quick summary of electrical news faces advertisement page 20.*

# Aluminium strip windings

by B. H. J. Rata, B.Sc. (Eng.), A.C.G.I.*
and J. S. Haggitt, A.C.T. (Birm.), Graduate I.E.E.†

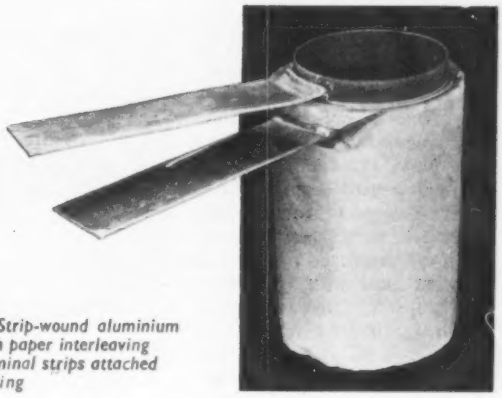


*Fig. 1. Strip-wound aluminium coil with paper interleaving and terminal strips attached by welding*

THE fact that aluminium strip-wound coils can offer economic and technical advantages over the conventional copper wire-wound coils has, in recent years, aroused considerable interest in the use of wide, thin-gauge aluminium strip for electrical chokes, solenoids, magnets and transformers. Much progress has been made both in the USA and, more recently, in Britain in several aspects of development, including work on insulating techniques, particularly continuously anodised strip, the design of winding machines and the selection of jointing methods.

At the present time the application is limited to windings that would require round copper wire down to 24 s.w.g. and to coils wound on circular formers. However, these are only general limitations which further development work will undoubtedly widen to cover other gauges and coil sections.

In presenting this review of aluminium strip for electrical windings, recourse is made to work undertaken by Northern Aluminium Co. Ltd. and its research associate, Aluminium Laboratories Ltd. Northern supplies aluminium strip (which in the aluminium industry implies material 0·007 in. thick and over) in coils down to 0·5 in. wide, and also supplies stock to foil rollers from whom foil (material less than 0·007 in. thick) is obtained.

Details are included of insulating and jointing techniques, together with notes on the design of strip-wound coils.

## The Technique of Strip Winding

A strip-wound coil consists of material wound layer upon layer with the width of the strip equal to the width of the coil. Coils wound in this form can have a better space factor than is obtainable with round wire and, even when allowance has been made for the lower conductivity of aluminium, it is possible to produce coils comparable in size with conventional copper coils. The aluminium strip size is selected to have the same resistance as the copper wire being replaced and the number of layers in the strip is equal to the number of turns in the copper coil (Fig. 3). As well as appreciable savings in material and manufacturing costs, strip windings offer definite technical advantages which may be summarised as follows:

1. Strip windings use a simplified winding technique. Costly winding equipment with traversing gear is eliminated, coils can be wound on to thin cylindrical formers and flanged bobbins are not necessary.

2. Electrical characteristics are improved. The insulation between each layer is subject only to inter-turn voltage while the thicker insulation required for inter-layer insulation on a conventional winding is eliminated. Inter-turn capacitance is more evenly distributed throughout the winding.

3. Thermal characteristics are also improved. The edges of each turn are in direct contact with the coolant which, combined with a low temperature gradient across the width of the coil, helps to eliminate local hot spots.

4. Strip windings also give a better space factor, depending on the shape of the conductor being replaced. Whereas there are considerable air spaces in round wire windings, in a strip winding the entire volume is occupied by metal and insulation. Even when allowance has been made for the 60% increase in conductor volume to offset the lower conductivity of aluminium, it is sometimes possible to produce coils that are no larger than their copper equivalents.

5. Aluminium has no catalytic action on transformer oil and strip-wound transformers could be operated at higher temperatures than are at present permissible with copper windings without the risk of "sludging."

6. Anodising, a technique unique to aluminium, can be used to form high-temperature insulation. Because the anodic film is much thinner than any interleaved insulation, coils wound with anodised strip have an even better space factor.

7. Aluminium strip windings are lighter in weight. When allowance has been made for the lower conductivity of aluminium, a strip-wound coil will weigh only about half as much as a copper coil.

## Insulating Materials

Strip windings can be insulated either by interleaving with an organic material or by using anodised material in which the artificially thickened oxide film on the surface of the metal provides the insulation between turns. Three techniques have been well tested by Aluminium Laboratories Ltd. and can be recommended.

*Kraft Paper.* This low-cost interleaving material, suitable for low temperature insulation, is obtainable in a range of thicknesses. Although its electrical properties are limited, it is quite suitable for many applications where, as a feature of strip winding, the inter-turn voltage is low. Satisfactory small coils can be made by interleaving without sealing or impregnating the winding but, in order to obtain sufficient rigidity in the winding and, where necessary, to exclude moisture, the complete coil can be impregnated. If desired, the winding can be fully impregnated in the normal manner using conventional equipment and varnishes. Good, strong windings can also be made by flowing varnish through a "drip-feed" on to the coil as the winding proceeds. This effectively bonds the coil but it does not have the full effect of vacuum impregnation and some air pockets are likely to remain within the winding.

*"Melinex."* This is the registered trade name of the polyethylene terephthalate film manufactured in Great Britain by Imperial Chemical Industries Ltd. A similar

* Northern Aluminium Co. Ltd.
† Aluminium Laboratories Ltd.

film under the trade name of "Mylar" is manufactured in the United States by Du Pont. It is tough, transparent and very flexible and is available in a range of thicknesses down to 0·00025 in. The dielectric strength is very good and the water absorption low; moreover, it has high resistance to chemical attack and does not become brittle with age. There are, however, some conditions which should be avoided, e.g., where it is likely to be contaminated by concentrated alkalis, acids, steam and some organic solvents.

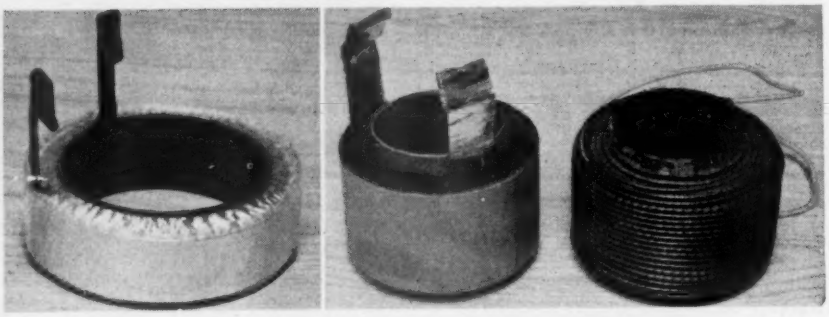


*Fig. 2 (left). A layer wound aluminium strip coil with cold-welded strip copper terminations. Fig. 3 (right). Aluminium strip and copper wire coils of comparable rating do not differ greatly in dimension*

Coils interleaved with "Melinex," like paper-interleaved coils, can be impregnated but it should be noted that, whereas paper is porous, "Melinex," being a non-absorbent material, will not "take-up" impregnants. High vacuum techniques are required to obtain full penetration and only solventless varnishes should be used, for the winding is such that there is a tendency for solvents to remain trapped within it. All the commonly used solventless varnishes and impregnants can be employed for operation up to 90°C, but above this temperature some materials affect the properties of the film and the advice of ICI should be sought as to the suitability of any particular impregnant to be used. For operation at higher temperatures—up to 120°C—silicone and epoxy resins give satisfactory results.

*Anodising.* By artificially thickening the oxide film on the surface of aluminium, a compact, tough but flexible insulating film can be obtained, its properties depending on the anodising process used and the film thickness. Voltage breakdown, for example, varies with these factors. In general, a minimum film thickness of between three and five microns (0·00012 in. and 0·0002 in.) is considered necessary both to obtain high insulation strength and sufficient protection from mechanical damage. These thicknesses are considerably less than can be obtained from interleaved materials, so anodised insulation offers the highest space factor. Breakdown voltage within this range will be between 90 V and 250 V, which is generally adequate for normal inter-turn insulation requirements.

Where anodised insulation is used, it is vital that the film should be continuous over surfaces and edges of the strip. To achieve this, it is essential that strip to be anodised should have rounded edges without burrs or sharp corners. Such a condition can be obtained either mechanically or chemically, and all strip (from 0·007 in. to 0·020 in.) supplied by Northern Aluminium Co. specifically for strip windings (whether for anodised or interleaved coils) receives a special edge treatment (Fig. 4).

Aluminium oxide insulation can withstand temperatures far in excess of the melting point of aluminium, therefore anodised coils can be operated at temperatures much higher than coils with conventional organic insulants. However, to obtain mechanical strength and rigidity it is necessary to bond, seal or impregnate and, at the present stage of development, the operating temperature must be limited to that necessitated by the use of organic materials such as silicone resins.

The three forms of insulation described can conveniently be used to cover the complete temperature range classified in BS 2757 : 1956 "Classification of Insulating Materials for Electrical Machinery and Apparatus on the Basis of Thermal Stability in Service," as follows :

| Class | Temperature | Insulating Materials |
|---|---|---|
| Y | 90°C | Kraft Paper<br>"Melinex" |
| A | 105°C | Kraft Paper<br>"Melinex" |
| E | 120°C | "Melinex" |
| B | 130°C | Anodised Strip |
| F | 155°C | " " |
| H | 180°C | " " |
| C | over 180°C | " " |

In addition to these established techniques, other bonding and sealing materials are being investigated to overcome the temperature limitations of organic impregnants on anodised windings. Other insulating materials, in particular resins or lacquers for direct application to the strip, are being developed with the aim of covering a range of temperature requirements.

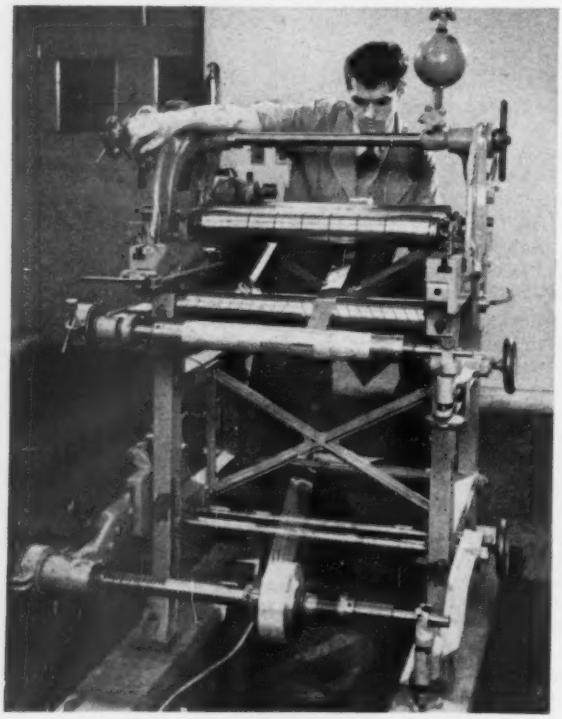


*Fig. 5. A typical foil slitting and winding machine modified to produce strip-wound aluminium coils with "Melinex" interlayer*

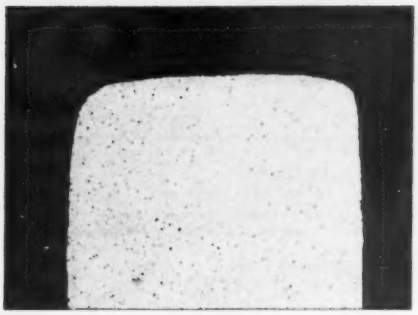


*Fig. 4. Photomicrograph showing rounded edge of strip section prepared for anodising*

## Terminals and Tap Connections

The selection of a jointing technique will depend upon the size and thickness of material involved. A number of methods have been tested and include the following:

*Folded-out terminals.* This, one of the early techniques to be employed, is quite useful for coils wound from thick strip on which end terminals can be made by folding out the strip used for the winding. If the strip is sufficiently thick as to be self-supporting, bolted connections can be made by punching holes in it, a technique that can also be used for terminals on narrow-width coils. However, it is not really suitable for thin-gauge materials or for tap connections. With thin-gauge materials the leads are very fragile and tend to break off at the junction with the coil. Folded tap connections are generally too bulky and coils with a number of these connections become irregular and non-circular.

*Cold-pressure welding.* Quick and simple to apply, cold welding can be used for joining aluminium to aluminium and aluminium to copper. No heat is required and it is possible to develop the pressure needed to make a successful weld using hand tools. In forming a cold pressure-weld, sufficient pressure must be applied through dies to cause the metal to flow, for when two perfectly clean aluminium surfaces are brought together under pressure a true weld with continuous grain structure can be obtained. Rather surprisingly, where one of the surfaces to be joined is anodised no surface preparation is required and good joints can be made to anodised strip, plain strip or to copper. The copper should be annealed and the surfaces must be cleaned.

Cold pressure welds can be made between aluminium surfaces but tool design is far more critical and as the surfaces must be chemically clean it is not easy to obtain satisfactory joints. However, the insertion of a thin piece of anodised material enables joints between two pieces of plain aluminium and between plain aluminium and copper to be made as readily as with fully anodised strip, and this form of sandwich construction is very useful (Fig. 2).

Very high electrical conductivity and mechanical strength can be obtained in cold pressure-welded joints, including joints made with anodised strip.

For many applications, particularly where coils are comparatively small and wound from thin-gauge material, it is convenient to solder copper wire connections. This can be done with strip-wound coils by first terminating the windings with copper wire cold pressure-welded to the aluminium strip and then soldering to these copper connections.

*Soldering and welding.* These techniques, particularly where argon arc welding is available, can be applied to the thicker gauge materials. Soldering is satisfactory on strip down to 0·015 in. thick and welding on aluminium down to 0·025 in. For the very thickest material these are probably the best methods of jointing but care must always be taken to avoid overheating and possible damage to the insulation. Soft-soldered joints can only be used where maximum service temperatures do not exceed 140°C.

*Mechanical connections.* Terminal connections can be made either by riveting or bolting but the resulting joints tend to be rather bulky. With the very wide range of width and thickness of strip that can be used for coil winding, it is not really possible to make any general recommendation and each case should receive individual consideration.

## Winding Equipment

Existing machinery can often be modified without difficulty for strip winding. Traversing gear is not required but it is necessary to have some winding guides, particularly if multi-winding on one spindle is employed. All winding, whether with interleaving or of anodised strip, should be carried out under tension to obtain compact coils while accurate alignment of strip and former is essential to prevent wander during winding (Fig. 5).

## Design Procedure and Strip Equivalents

When considering the redesign of an existing coil winding the first step is to determine the cross-sectional area required in aluminium for equal conductivity. Material in the range of electrical purity 99·5% aluminium to commercial purity 99·25% aluminium is suitable for strip winding. For practical purposes this means that the cross-sectional area in copper should be increased by 64%. Relevant properties of aluminium are given in Table 1. Experience has shown that material in the annealed or soft condition is preferable for strip windings.

The selection of a suitable width for the strip-wound coil will depend upon a number of factors. If width is limited, the cross-sectional area required will determine the strip thickness; conversely, if it is necessary to limit the overall diameter, the strip width can be increased to obtain the necessary area. In existing windings, either

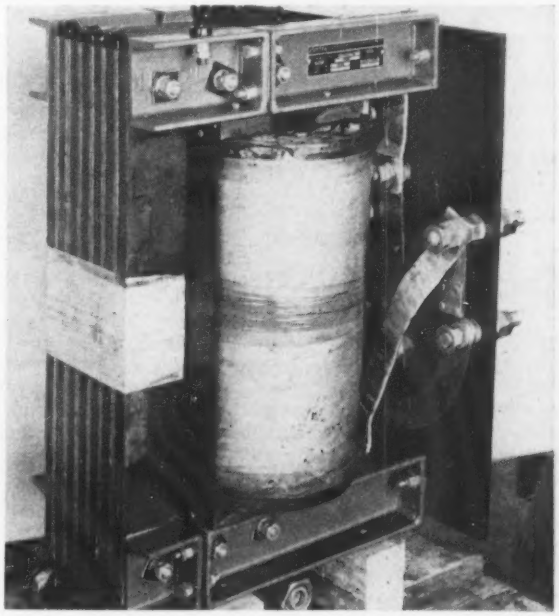


*Fig. 6. A single phase 360 kVA, 3.000 c/s, 1,500 V primary auto transformer with secondary tappings from 1,200 V to 1,600 V in 50 V steps, incorporating a water cooled core and anodised aluminium strip winding (Foster Transformer Co)*

**Table I**
**Some Properties of Aluminium**

| | |
|---|---|
| Electrical Resistivity microhm cm. ... | 2·9 |
| microhm in. ... | 1·142 |
| Temperature Coefficient of Resistance per °C ... ... ... ... ... | 0·00403 |
| Linear Temperature Coefficient of Expansion (20°-200°C) per °C ... | 0·000023 |
| Thermal conductivity Cal/sec/cm²/cm/°C | 0·53 |
| Modulus of elasticity lb/sq in. ... ... | 10·0 × 10⁶ |

coil width or overall diameter or both may be fixed; in developing strip-wound coils it should be remembered that thicker material results in coils with higher space factor and also that narrow coils have better cooling characteristics than wide coils. Winding strip coils is much quicker than winding wire coils and, furthermore, the thicker the strip the easier the handling becomes.

Table II gives a number of aluminium strip and foil sizes and their equivalents in round copper wire, but this is only a selection for many intermediate gauges and widths are possible. When winding interleaved coils the insulating material should be between $\frac{1}{4}$ in. and $\frac{1}{8}$ in. wider than the strip; this ensures that the inter-turn insulation is fully maintained across the edges of the coil. Depending upon the application, the coils may be sealed, impregnated or left untreated. The overlap of insulation in interleaved windings, when suitably treated, allows the coils to be wedged or supported across the ends of the winding.

The following formulae can be used for the design of stripwound coils :

(1) Overall diameter (in.): $d_1 = [2\,n\,(t_1 + t_2) + k] + d_2$

(2) Mean length of turn in a winding (in.): $m = \frac{\pi\,(d_1 + d_2)}{2}$

(3) Total length of strip in coil (in.): $l = m\,n$

(4) Resistance of a coil at 20°C (microhm): $R = \frac{m\,n\,\rho}{a}$

(5) Weight of aluminium in a coil (lb): $W = 0.098\,l\,a$

Where: $d_1$=overall diameter of coil (in.)
$d_2$=internal diameter of coil (in.)
$n$=number of turns
$t_1$=strip thickness (in.)
$t_2$=insulation thickness (in.)
$k$=allowance for winding space factor, usually 10%
$m$=mean length of turn in a winding (in.)
$l$=total length of strip in a coil (in.)
$R$=resistance of a coil at 20°C
$\rho$=resistivity of aluminium at 20°C (microhm in.)
$a$=strip cross-sectional area (sq in.)
$W$=weight of aluminium in a coil (lb)

## Conclusions

The basic techniques for winding and insulating coils using aluminium strip are now well established. Further investigations are being made, particularly into other insulants, including resin-coated materials, and improved winding and jointing techniques. This work will undoubtedly expand the present limitations on gauges and coil sections and emphasise still further the advantages of aluminium strip-wound coils.

The services and advice of Northern Aluminium Co.'s Sales Development Division, backed by the extensive laboratory facilities of their associates, Aluminium Laboratories Ltd., are freely available to firms interested in investigating the technique of strip winding.

**Table II**
**Selection of Aluminium Strip and Foil Sizes**

| Copper Wire s.w.g. | Aluminium Strip in. | Aluminium Foil in. |
|---|---|---|
| 2 | 10 × ·010<br>5 × ·020<br>2·5 × ·040 | 20 × ·005 |
| 6 | 4·75 × ·010<br>2·0 × ·024<br>1·0 × ·048 | 15 × ·0032<br>10 × ·0048 |
| 10 | 2 × ·010<br>1 × ·020<br>0·5 × ·040 | 10 × ·002<br>5 × ·004 |
| 14 | 1 × ·008<br>0·5 × ·016 | 8 × ·001<br>2 × ·004 |
| 18 | | 2 × ·00015<br>1 × ·003<br>0·5 × ·006 |
| 22 | | 2 × ·0005<br>1 × ·001<br>0·5 × ·002 |

# Treating Electric Shock

LATEST developments in American work on the treatment of electric shock is reported in the June number of *Electrical Engineering*, the journal of the American IEE. In a paper by W. B. Kouwenhoven and other members of the staff of the John Hopkins University, Baltimore, information is given on treatment for ventricular fibrillation. This is a twitching of the heart which sometimes follows electric shock, and stops the normal process of pumping blood round the body. The only reliable and effective method of stopping ventricular fibrillation is to send sufficient electric current through the heart to contract it and bring the twitching fibres to rest.

A hospital equipment for doing this has been used successfully. Electrodes are placed on the patient's skin at the base of the neck (suprasternal notch) and one inch below the left nipple. A voltage of either 480 V a.c. for adults, or 240 V for children, is applied through 9 sq in. electrodes. This treatment of fibrillation has always been successful, though in some cases a second shock given 15 or 20 seconds later has been necessary. At present a portable defibrillator is under development.

One of the problems is to keep the patient alive until the defibrillator can be brought into action. With no help, irreparable damage occurs in 2-3 minutes. At present, the best method seems to be to compress the chest by placing the heel of one hand on the breast bone close to its lower end, and the other hand over it (one hand only for a child). The heart should be squeezed 40 to 60 times per minute. This seems to keep some 30-40% circulation of the blood continuing. If possible, artificial respiration should be applied simultaneously, to maintain the air supply to the lungs. The authors recommend that the mouth-to-mouth method should be used (ELECTRICAL TIMES, 17 March, p. 414), but they say that in many cases, any method will be effective, such as Holger Nielsen.

# B.B.C. Television Centre

## FIRST STUDIO BECOMES OPERATIVE ON 29 JUNE

ELEVEN years and some £10 million ago the British Broadcasting Corporation purchased 13 acres of the site of the 1908 Franco-British Exhibition at Wood Lane, Shepherds Bush, and proceeded to make plans for the erection of a fully equipped centre from which all the future television activities could be radiated throughout Great Britain. At the time, TV links with the Continent, tape recordings of vision and colour TV were just among the hopeful imaginings of technicians but, such was the faith in the future of these things, that provision was made for them in the plans for the buildings which now dominate the site.

On 29 June the first of the studios will be ready to go "on the air" and during the past days parties of visitors from the technical and trade Press have been visiting the new centre, which already is populated by nearly 2,000 of the BBC staff. The project comprises three building blocks which are planned for erection in four stages. The first block, which can be seen on the left of the picture above, is for the design and construction of scenery used in studio productions. It was commenced in 1951 and completed in 1953, since when the bulk of the various "props" and backgrounds seen in BBC productions have been designed and made here.

The second block, just out of the picture on the right, is the restaurant building, commenced in 1953 and completed in 1955, but used for offices and rehearsal rooms until comparatively recently. It is now converted back to its original purpose and provides restaurant facilities for the 3,500 staff and visitors which are expected to occupy the centre before long.

This is connected to the main building, a circular block of offices 500 ft in diameter and surrounding a central court, comprising five floors of administrative offices, a floor of engineering and maintenance offices, a floor of studio control offices, rooms and technical equipment and, at ground level, entrance halls, dispersal areas and dressing rooms. Radiating around this block are seven studios, of which four are in course of construction and one, Studio 3, with a floor area of 8,000 sq ft, is completed and equipped for the first transmissions to take place on 29 June. The largest studio will have a floor area of 10,800 sq ft and incorporates an 11,500 sq ft tank for aquatic spectacles, Three smaller studios, 2, 5 and 7, are for talks, school programmes and general purposes and will be completed about mid-1961. A second 8,000 sq ft studio, No. 4, will be completed by the autumn of this year. The final stages, the completion of the block extension away to the right and the erection of a further block in the foreground, are not contemplated for some time yet.

All studios are connected on the outer periphery by an enclosed walk-way connected by a covered way to the scenic block and this will be used to channel the hangings and stage furnishings to and from the studios. On the inner periphery, the actors and producers will enter and leave the stages so that the two flows, scenery and actors, will never conflict. Control of each studio is from rooms on a level above the floor of the studios and separated from them by glass windows.

The technical control of each area is divided into sound and vision areas and the electronic equipment is on a scale far above that in any other British television centre and, possibly, above that in any other country as well. All the output from each area is channelled to the central apparatus room which forms part of the presentation suite which will, in time, become the vital centre of the whole television system, controlling and regulating programmes from all British and foreign sources and dispatching them to the transmitters. This equipment includes a number of vision tape recorders and also apparatus for interchanging programmes from countries operating at different numbers of lines.

### Electrical Supplies

The electrical load for this centre is taken at 11 kV from the LEB and the estimated maximum demand is expected to be between 3·5 and 4 MW but, when colour television arrives, this may increase, through the demands of extra lighting, to about 5 MW. The supply is stepped down from 11 kV to 415 volts at three substations arranged round the outer periphery of the central block at studio roof level through 750 kVA class H dry type transformers with air-break solenoid-operated circuit-breakers remote controlled from a central control board with a large mimic diagram. This board enables transformers to be parallelled or used separately to feed different sections of the distribution system and is constantly under control of the engineer-in-charge; 110 volt d.c. supply for arc lighting in back projection equipment and other purposes requiring d.c. is provided from a number of 55 kW germanium rectifiers in each substation. Emergency lighting is also provided on a large scale and a centralised fire alarm system guards against fire risks, which have been carefully assessed and legislated for as far as humanly possible.

Heating for the whole site is from oil-fired boilers and an extensive ventilation and cooling system, incorporating a Carrier automatic absorption heat exchanger for cooling the air, is also installed.

Among the very many sub-contractors who have supplied electrical equipment to the centre are the Strand Electric (lighting control equipment), Hall Stage Equipment (cyclorama tracks), Revo Electric, Atlas Lighting and General Electric Co. (lighting fittings), Standard Telephones and Cables (P.A.B.X. installations), English Electric, Brookhirst Switchgear, Watford Electric, Lancashire Dynamo, Simplex Electric, South Wales Switchgear and Whipp and Bourne (switchgear), Brush Electrical (transformers), Hackbridge and Hewittic (rectifiers), Marconi's Wireless Telegraph Co. and EMI Electronics Ltd. (cameras and associated equipment) and British Insulated and Callender's Cables (cables).

# Readers Views

*Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor*

## Unsatisfactory Wiring

In your issue of 26 May you published a letter from Mr D. J. Legg headed "Unsatisfactory Wiring." To attempt to assert that no electrical contractor or his staff is capable of making a mistake would be both foolish and untrue. Adequate supervision is essential at all stages of an electrical installation, followed by a thorough testing before the supply authority is called upon to connect.

It is, I think, unreasonable that Mr Legg should suggest that the professional electrician is "frequently" guilty of serious wiring errors. The vast majority of electrical installation work in this country is carried out skilfully and efficiently. Indeed, in all the statistics on electrical accidents by the Factory Department and the Home Office for industrial and domestic installations, very few of the accidents are caused by inefficient electrical installation work carried out by qualified men. In the case quoted by Mr Legg, there would seem to have been a series of errors, not only by the electrical contractor but by others concerned.

Finally, may I point out that my own association has sufficient confidence in the work of its members to guarantee their work quite independently. So few claims have been received from customers under this scheme that, for the second time since its inception in 1947, the amount of the guarantee is about to be doubled.

*L. C. Penwill*, C.B.E., COMP.I.E.E.,
DIRECTOR, THE ELECTRICAL CONTRACTORS' ASSOCIATION, LONDON, W.C.1.

## 132 kV and Area Boards

I AM sorry if my remarks at the British Electrical Power Convention, about the cost of giving area board supplies, gave any impression of "complaint" as reported in your issue of 9 June. All I intended to do was to point out that whereas Mr King's paper referred to the possibility that the area boards might before long be thinking about raising their primary distribution voltage to 132 kV, the 132 kV grid is already serving as a large distribution system and, as a rough estimate, some 40% of the Generating Board's transmission expenditure must be attributable to the provision and connection of points of supply from this system.

The comments about more compact stations and more power per wayleave were made in the context of considering future transmission problems.

*F. J. Lane*, O.B.E., M.SC., M.I.E.E.,
SANDERSTEAD, SURREY.

## Classifying Cable Soils

YOUR discussion in the issue of 26 May, 1960, of the ERA Report F/T198 on "Soil Classification for Cable Engineers" covers the background of the problem in a complete and informative manner. I would, however, like to point out that in the table you printed showing the classification schedule, in the column headed "Pinch," there should *not* have been a line above the wording. In other words, the sub-division "1" of the pinch test should cover all the soil types A, B and C.

One fact which has become apparent as our interest in soils has increased is that, in general, reliance cannot be placed on descriptions of soils. This is a result of the fact that people, from childhood, have associated different descriptive names with various soils and the descriptions for any one soil type vary from person to person. As a result, much of the information on soils can, at best, be used only on a very broad basis of soil type, and very often information cannot be used at all. We hope that this method of classification, which is simple and speedy, will be adopted by engineers who are interested in the soil environments of cables, so that descriptions of installations and operating conditions will be readily comparable. This use of the classification schedule, as a means of providing an unambiguous terminology for soil identification, is one which we hope will be applied now. A great deal of laboratory work is envisaged into the investigation of possible correlations between thermal properties and soil types. When definite trends have appeared in this investigation, much time will be saved if the details of field experience are available and can be compared with the results found in the laboratory.

*M. J. Vanner*, M.A.,
ELECTRICAL RESEARCH ASSOCIATION,
LEATHERHEAD, SURREY.

## Mercury Switches

I WAS interested to read in your issue of 12 May Mr Baggs's comments regarding the operation of mercury switches fitted to relay mechanisms. However, whilst I endorse his views regarding the use of conventional clapper-type solenoid mechanisms, I would like to point out that my company has for many years been producing a relay specifically designed for operating switches.

The movement is of a semi-rotary pattern and, since the switches are mounted as near as possible to the centre line of the relay, there is no possibility of the mercury being thrown against the end of the switch. Relays of this type have been so successful that we are able to supply ratings of up to 200 A per pole.

We have also overcome transit difficulties and send relays by post or BRT without trouble.

*K. A. Camping*,
SALES MANAGER,
ENGEL AND GIBBS LTD., BOREHAM WOOD, HERTS.

* * *

I AM pleased to note Mr Camping's confirmation of the views I expressed regarding the operation of mercury switches. Mercury switches, by their very nature, tend to tempt the uninitiated to mount them on operating mechanisms which may be quite unsuitable, and whilst in the very smallest sizes this may not give trouble, there can be no doubt that for their most satisfactory use, the operating mechanism should be designed for the purpose. This does, of course, apply to the mechanism to which Mr Camping refers and to our own, which is available in similar sizes.

*J. Baggs*,
DIRECTOR, JOHN BAGGS AND CO.,
UPPERMILL, NR. OLDHAM, LANCS.

# Contractors and trading

## E.C.A. SCARBOROUGH CONFERENCE LOOKS TO FUTURE

SCARBOROUGH earlier this week was the venue for the annual conference of the Electrical Contractors' Association. The many ECA members who attended, with representatives of other sections of the electrical industry, were able to discuss papers on the prospects of electrical retailing and on technical practices in electric floor-heating. First, however, after a civic welcome, they were given a broad, sweeping survey of the contracting scene by the retiring president, Mr V. J. Stock.

### Trade Discounts

Mr Stock devoted much of his address to trading matters. Mr Stock feels that the electrical industry has owed its prosperity in the past to a system of agreed trade discounts and list prices which provided each section of the industry with the funds necessary for research and developments. During the past two years, trade associations have lost most of their power through their inability to control prices and discounts. Mr Stock thinks this presents the electrical industry with the greatest problem it has ever had to face. Unless individual manufacturers are prepared to accept some measure of self-discipline, there will be severe restrictions in the improvement and development of the industry's products. Production of new equipment will be restricted to a degree which will jeopardise the industry's standing in world markets.

Self-discipline of the sort necessary should not be restricted to manufacturers; distributors and contractors need to accept it as well. The experience of the cable industry over the past nine months is a cogent example of the breakdown of commercial discipline. The situation in that period was aggravated by contractors who endeavoured to score over their competitors by demanding greater and greater discounts. In an industry which works largely through cost-plus contracts, the extra discounts were passed on to the customer and, in fact, the contractor lost profit. Mr Stock's personal estimate is that loss of turnover to the contracting industry from this single cause amounted to over £300,000 in nine months.

The Fair Trading Council, which for over 30 years has provided the code of trading practice in the electrical industry, is on the verge of liquidation, says Mr Stock. He has no doubt that its disappearance will be a tremendous loss to the industry and he pleads with manufacturers, wholesalers and retailers alike to keep alive by example the FTC principles.

### Retail Activities

One of the most active committees of the ECA has been the Electrical Retailers' National Committee. It has already produced two editions of the retail brochure, and a more ambitious publication is planned for later this year. The used price list of major domestic appliances has also proved of value and further sales aids are planned. Arrangements with a banking house have now been made which will enable retailing members of the Association to compete satisfactorily with the hire-purchase terms offered by departmental and chain stores.

So far as contracting is concerned, the Association has given attention to the growth over the past year of placing contracts on a fixed price basis. The policy is to urge members either to refuse such contract terms or to add such a percentage to the gross estimated figure so as to provide against all possible contingencies.

### Labour Relations

In the labour field, the fact has to be faced that contracting is not as profitable as it ought to be, partly because of the fall in production over the years since the war. When hours were cut from 47 to 44 a week there was no appreciable rise in production and there has been a steady decrease since that time. Now that further reductions in the working week are being asked for, it is felt that there will be no compensatory rise in production. Since the labour force cannot be increased immediately, the only result of reducing the nominal working week would be to commence overtime payments earlier. If operatives co-operate, they will find the employers not unreasonable. Co-operation, however, means starting work and finishing it on time, limiting luncheon and other breaks to the agreed period. Mr Stock's estimate of the increase in production if these rules were honestly observed is no less than 12½%.

### Retailing Prospects

Recent changes in retailing in the UK are discussed by Mr N. A. H. Stacey (GEC) in a paper giving particular attention to the small trader. His theme throughout is that the retailer cannot afford to follow established practices blindly, leaving others to innovate. To any who query whether changes are worth while, because they believe that the high level of consumer buying cannot continue much longer, the answer is that such a question is born of pessimism, coupled with a basic misunderstanding of contemporary commercial facts of life. In the present age of mass production, an increasing proportion of the working population is engaged in trade and services rather than manufacture. In America, only one person in five works in manufacturing, while in contemporary Britain the figure is two in five.

Growth of productivity in the retail trades has been far from spectacular. Statistics show that for a given output, more labour resources are required in distribution than in manufacturing. This reflects in the income of workers in these trades. Such considerations underline the need for making retailing more efficient. Considering the smaller retailer, the first question is whether he uses the money invested in his business to the best advantage.

Examination of comparative figures for 1950 and 1957 show that while in 1950 the turnover of multiple stores was more than one-third of that of independent traders, by 1957 it was more like two-fifths. Average sale per

**Table I. Particulars to Accompany Floor Heating Inquiry.**

1. **Comfort Effect:** The floor-heating system is to be designed to maintain an internal air temperature of ...°F against outside ...°F with normal natural ventilation throughout (mention should be made of the temperature required for different types of rooms).

2. **"U" Values:** The following "U" values should be used in calculations:

*External walls* .. .. ...
*Partition walls* .. .. ...
*Window glass* .. .. .. ...
*Roof glass* .. .. .. ...
*Roof flat* .. .. .. ...
*pitched* .. .. .. ...

3. **Scope:** The areas to be heated are indicated on:

Drawing Nos. .. .. ...

4. **Downward losses:** The following should be allowed for in calculations in respect of heat lost non-beneficially to the rooms concerned:

*Ground floors* ...% upwards emission
*Top floors* .. ...% upwards emission
*Overhanging floors* ...% upwards emission

5. **Margin:** A working margin of ...% should be added to all final calculated loads, for restricted intake operation.

6. **Intake hours** (state local off-peak periods).

7. **Electricity supply** (confirm voltage).

8. **Floor surface limits:** The system is to be designed with floor-surface temperatures limited to:

*Rooms generally occupied* .. 80°F
*Entrance halls, corridors,* etc. 85°F

subject to the suitability of floor finishes as shown on the drawings or as schedules hereunder.

9. **Heating Load:**

*Floor heating* .. .. ... kW
*Supplementary* .. .. ... kW
*Total* .. .. .. ... kW

10. **Supplementary heating:** Type, general disposition and supply requirements to be indicated.

11. **Electricity consumption:** The electricity consumption to be expected for an average heating season of ..... days' duration is:

*Floor heating* .. .. ... kWh
*Supplementary* .. .. ... kWh

outlet in the independent shop was 2·3 times larger in 1957 than 1950, compared with 1·8 as the corresponding ratio for the multiples.

Mr Stacey suggests that retail margins are another good yardstick of efficiency and notes that with the exception of bakers in the food trade, variety and general stores and jewellers, radio and electrical shops show the highest gross margins. Between 1950 and 1957 they achieved an increase in gross margins relatively high compared with most other activities. However, further analysis of the figures shows that while during the period under review the small man increased his margin by 0·7%, the large chains of shops increased theirs by 6·9%—almost ten times as much as the smaller man. The inference from all the statistics is that the small shop is often a high cost distributor and the large shop a low cost distributor.

Despite such considerations, Mr Stacey believes that the small man in the electrical and radio retail trade is in a better position than his fellow trader in the many other branches to review his position now and make the changes in organisation that will keep him prosperous.

The real competitors of the small man are the chain stores. Relatively new retailing methods, such as the growing volume of mail order business, the increase in tally business and the growth in numbers of mobile shops and auto-vending, although sizeable, are of secondary importance. Multiple stores are better merchandisers and often more effective price cutters than the solitary trader. They are good, if keen, buyers and command considerable resources.

Faced with this situation, the small retailer should work for a rise in his trading productivity rather than in discount margins. He must become more of a specialist, as the manufacturer already has, and as the wholesaler shows every prospect of becoming.

## Help from the Wholesaler

The retailer should be able to look to the wholesaler for much help in improving his retailing effectiveness. In America, some wholesalers go as far as maintaining shop-opening services, besides many other advisory facilities, for the retailer who trades exclusively with them. However, in Britain such far-reaching co-operation between wholesaler and retailer is only on the horizon.

The voluntary association of retailers for purchasing is a more immediate prospect in this country. One method is the "retailers co-operative," which operates to obtain lower prices on bulk orders by the sensible pooling of orders for branded and other goods.

The "voluntary purchasing group" is different in that the centre of the organisation is a wholesaler. Retailers agree to take a certain proportion of their needs from the wholesaler, who in turn passes on price advantages.

## Floor-warming

Points to be watched by the electrical contractor who seeks business in the electrical floor-warming field are discussed in a paper by Mr R. D. Jackson (Tyrad) Manufacturers of electrical floor-warming equipment have under preparation a code of practice which should be available soon. However, the contractor seeking to establish himself in this field must have some knowledge of what is involved before he passes inquiries to manufacturers. Mr Jackson's paper seeks to provide this.

Throughout the development of electrical floor-warming, manufacturers have been obliged to offer a design service. This is something new for the heating trade. In the longer-established sections of that trade, manufacturers' service extends only to information on the proper use of equipment; it is the heating engineer who carries out designs and submits tenders.

At present, if a contractor invites schemes and prices from several manufacturers he is likely to be bewildered by the diversity of recommendations he receives. The key-point to remember is that all floor-warming systems, whether directly embedded or rewirable, produce the same result for the same operating condition. The only variation is in the cost of equipment. Mr Jackson suggests that any inquiries for help from manufacturers should be on a systematic basis, with "U" values and the like clearly stated. (See Table 1.)

The paper contains much technical information which will not be summarised here. However, one important section that certainly needs attention is that of on-site supervision, monitoring and fault-finding. Mr Jackson believes that the importance of site supervision during the laying of floor-warming equipment cannot be over-stressed. Layout of heating elements and controls must follow closely the designs prepared and any deviation from working drawings should be referred back to the designer.

One difficulty with embedded systems has been the lack of fault-finding equipment. This position will be eased when an instrument developed by Mr Arkinstall (MEB) comes into general production. This engineer has been involved in fault-finding throughout the country Mr Jackson says, and his experience is that there have been no faults due to bad manufacture of elements.

In laying elements, care should be taken that they are not put down until site conditions are satisfactory, and that they should be laid only if floor screeds are to be finished immediately. It should be a rule never to lay elements today where floors are to be screeded tomorrow.

# Block heater survey

## COMPARATIVE COSTS OF HEATING OFFICES

COMPARISONS between cost of heating commercial buildings by thermal-storage electric block heaters and other heating methods were carried out during 1956 to 1957 and 1957 to 1958. Results of this work have now been published by the Electricity Council as Utilisation Research Report No. 14. The results show that block storage heating can be competitive with other methods.

### Test Installation

Eleven office premises associated with the supply industry were fitted with measuring instruments for the first of the two years, and the performance of their existing heating systems (see Table 1) recorded. For the second year, thermal-storage block heaters were installed. Overall, the results suggest that for a building initially fitted with a gas-fired central heating installation, running costs and capital charges were 15%-20% lower after conversion to electric heating. For solid fuel boilers, the electricity costs were 50%-100% higher than the corresponding fuel bills, but after allowing for labour and capital charges, in one case costs were 15% lower and in another up to 20% higher. However, when a block heater installation supplemented an equivalent direct-acting electric heating system the capital cost was two or three times as high, and the consumption up to 50% greater. What this means in terms of costs depends on the tariffs in force; for the premises involved in the test, total annual cost of the block heater system was up to 20% lower in two cases, and up to about the same amount higher than in the other two. Little difference has been found between block heater and floor-heating installations so far as performance and costs are concerned.

### Design and Operation

All the block heater schemes except that at Milton Hall were designed by the GEC, with an addition of 25% to calculated heat losses to cover intermittent operation. The exception, designed by the Eastern EB, allowed 50% addition. In all cases, only 1 kW and 1½ kW heaters were used, and the charge was limited to a maximum of eight hours overnight. Midday boosts were employed only in one or two premises, and then infrequently. Arrangements were made from December of the second test year to omit the Saturday-Sunday night charge if the temperature rose above 45°F. In some cases, additional direct-acting electric heating was used during the block heater period on occasion due to the construction of the premises concerned.

Tests were carried out with thermographs placed in two to five rooms of each of the premises. Check readings were made in other rooms from time to time. Electricity consumption was recorded throughout the heating season with daily readings, and maximum and minimum external temperatures were noted twice daily.

**Table I—INSTALLATION DATA**

| Item | Premises | Board or Division* | Method of Heating 1st Year | Method of Control | | Building Construction | | | Design Internal Temperature | Calculated Heat Loss | | Installed Heating Load (Electric) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Walls | | Glass Area per cent of Wall Area | | | | | |
| | | | | 1st Year | 2nd Year | External | Internal | | 2nd Year | Total | Per cu. ft | 1st Year | 2nd Year |
| | | | | | | | | % | °F (b) | kW | W | kW (c) | kW (c) |
| 1 | EAW | London | Gas-boiler (Central) | Satchwell Compensator | 2 × QA/QR and room thermostats | 13½ in. solid | 3 in. solid concrete (a) | 26 | 65 | 57 | 1·08 | (4) | 72(4) |
| 2 | Basingstoke | Southern | Solid fuel (Central) | Satchwell Compensator | QA/QR and room thermostats | 11 in. and 15½ in. cavity | 9 in. solid | 22 | 65 | 67 | 1·17 | (16) | 93(16) |
| 3 | Yeovil | Southern | | Satchwell Compensator | QA/QR and room thermostats | 15 in. cavity | 9 in. solid | 25 | 65 | 106 | 1·14 | 0 | 140 |
| 4 | New Mills | N. Western | | Manual | Maclaren T.T.R | 13½ in. and 18 in. solid | 4½ in. × 9 in. solid | 18 | 65 | 62 | 1·25 | 0 | 80(5) |
| 5 | Parkstone | Southern | Electric direct-acting | Manual | Maclaren T.T.R. | 11 in. cavity | 4 in. breeze | 24 | 65 | 74 | 1·03 | 49 | 74(8) |
| 6 | Rushden | E. Midlands | | Manual and room thermostats | Maclaren T.T.R. | 9 in. solid | 4½ in. solid | 17 | 65 | 45 | 1·37 | 22 | 56 |
| 7 | Stone | Midlands | | Manual | Maclaren T.T.R. | 13½ in. solid | 13½ in. solid | 17 | 60 & 65 | 27 | 1·13 | 26 | 36(3) |
| 8 | Bristol | S.W. Division* | | Room thermostats | Maclaren T.T.R. | 18 in. solid | 4½ in. solid | 10 | 68 | 69 | 1·08 | 63 | 84 later 93(5) |
| 9 | Southwark | London | Electric floor-heating | QA/QR Maclaren T.T.R. | QA/QR Maclaren T.T.R. | 11 in. cavity | 9 in. solid | 27 | 65 | 24 | 1·17 | 27 | 32 |
| 10 | Milton Hall | Eastern | | | | 13½ in. solid | | 28 | 65 | 17 | 1·05 | 29 | 27 |
| 11 | Pontardawe | S. Wales | | S.E.I. | S.E.I. | 13½ in. solid | Fibre-board | 17 | 65 | 49 | 1·19 | 38(8) | 62(8) |

Notes: (a) Brick, unless otherwise stated. (b) Design external temperature 30° F (Items 3 and 10: 27° F and 28° F, respectively) with allowance for two air-changes/hour
(c) Figures in brackets refer to supplementary electric heating used.

**Table 2. Comparative Costs of Heating Schemes**

| Premises | Annual Costs — £ | | Increase in Annual Costs in 2nd Year | |
|---|---|---|---|---|
| | 1st Year | 2nd Year | Running Costs % | Annual Costs %* |
| 1 | 387 | 308 | − 15 | −20 |
| 2 | 486 | 405 | + 44 | −17 |
| 3 | 595 | 644 | +104 | + 8 |
| 4 | 321 | 387 | + 90 | +20 |
| 5 | 402 | 328 | − 56 | −18 |
| 6 | 157 | 171 | − 15 | +11 |
| 7 | 133 | 159 | 0 | +19 |
| 8 | 418 | 386 | − 28 | − 8 |
| 9 | 48 | 46½ | − 12 | − 4 |
| 10 | 41 | 44 | 0 | +10 |
| 11 | 183 | 198 | − 11 | − 8 |

* Running costs, labour costs, interest at 5% and depreciation over 25 years. Costs adjusted to 1957/58 levels

## Results

The results show that in nearly all cases the mean temperature maintained by the block heaters during the occupation period in cold weather was at or above the design level. Nor was there much overheating in mild weather, although ventilation may have been increased to secure this result. Only two premises suffered occasional drops below comfort level at 5 p.m. without midday boost, one of them the Milton Hall installation. Control equipment did not seem to succeed in keeping day-by-day variations of temperature in cold weather at a really low level: the report suggests that it is clear that from this point of view there is much room for improvement in control methods and their applications. With few exceptions the average occupation period temperature maintained by the block heaters was somewhat higher than that with other systems in the preceding year, and there was a tendency to smaller week-by-week variability. Unfortunately, the apparently favourable temperature performance of the block heaters may have been falsified to some extent by the use of supplementary direct-acting electric heaters.

Comparison of cost and consumption are only possible after making allowance for the fact that the second year was appreciably colder than the first, the number of degree-days for the heating season being on average some 15% larger. It is notable that the Bristol installation, which was the only direct-acting electric heating installation operated by switching the whole installation on some time before office hours started, rather than leaving it switched on all night, showed an increase of about 50% for consumption with thermal storage block heaters installed. This is what could be expected on theoretical grounds because of the higher temperatures maintained by block heaters at nights and over the week-ends.

Cost comparisons after adjusting for different numbers of degree-days and temperatures are still in part dependent on local tariffs and on assumptions made about cost of labour for boiler stoking, etc. Table 2 summarises the results of the calculations made in the report.

In the concluding section of the report it is stated that the validity of comparative results of block heater and direct-acting electric heating installations is to some extent modified by the fact that use of the latter was less economic in the test installation than with ordinary commercial consumers, who would have to settle electricity bills. It is clear that comparative economy of off-peak heating will depend on the comparative tariff position. In other words, the results are biassed against direct electric heating. However, the records for direct-acting installations confirm the poor load factor of this method of heating. On an early morning and late afternoon basis, it was about 37% and 30%, respectively.

Installation of a block heater capacity 25% higher than the calculated heat loss appears to have been sufficient with some installations, but not all. The results suggest that the problem of dealing with a cold day following a mild night has not yet been solved from the control aspect.

In addition to the objective measurements, the subjective reactions to occupants of the building were checked through questionnaires. Broadly speaking, a temperature of between 65°F and 70°F has been found to meet the comfort requirements of most, irrespective of type of heating installation, while no clear pattern emerges of apparent likes and dislikes of the block heater system in comparison with the methods used previously. There was criticism of excessive warmth in the morning and insufficient warmth in the afternoon.

# E.C.A. SPEAKS ON ADEQUACY

LATEST electrical organisation to publish its evidence to the committee* looking into housing standards for the future is the ECA. The Association feels that the Housing Manual 1949 recommendations for number of socket-outlets is "utterly inadequate," and puts forward the following suggestions:

| | | | |
|---|---|---|---|
| Hall and landing ... | 1 to 3 | Single bedroom ... | 3 to 5 |
| Living room ... ... | 6 to 10 | Kitchen or utility room ... ... ... | 6 to 8 |
| Double bedroom ... | 5 to 8 | Garage ... ... ... | 1 to 3 |

These suggestions in their lower totals align with recommendations in the evidence of other electrical organisations. However, they are thought to fall below the best practice. One of the important advantages of providing an adequate number of socket-outlets in the original installation is that the consumer is less tempted to tamper with his wiring.

The ECA sees the move to smoke control areas as causing people to turn to electric heating. For the lower income family not likely to be able to afford whole-house heating, the convenience of electric heating makes it desirable; so does the relatively low capital cost compared with built-in systems. However, the association feels that the demand for centrally heated houses is spreading rapidly.

Suggestions that laundry facilities should be provided in bathrooms have been strongly condemned by the ECA. Most home laundry appliances are portable and it would be difficult to provide facilities for them in the bathroom without at the same time making it possible for the consumer to use a portable electric heater there.

On lighting, the Association stresses the advantages of spreading illumination over a number of lights in the form of wall brackets.

In reply to requests for ideas for improving safety in the home, the ECA make six suggestions.

1. All socket-outlets should be three-pin, shuttered and preferably switched.
2. All wiring systems should be concealed.
3. There should be no provision for portable appliances to be used in bathrooms (excepting BS shaver outlets).
4. Lighting points in hall, landings and stairways and dark places should be controlled from two positions.
5. Electric garden tools should be supplied from an l.v. transformer.
6. The entire electrical installation should be carried out in accordance with the IEE Regulations by a competent electrical contractor.

*Sub-committee on Housing Standards of the Central Housing Advisory Committee of the Ministry of Housing.

# Electrical safety in mines

## JUBILEE CONVENTION OF A.M.E.M.E. AT BLACKPOOL

IT is just 50 years since the Association of Mining Electrical and Mechanical Engineers was formed and the Jubilee Annual Convention, which opened at Blackpool on 14 June, will be remembered for the presidential address which effectively summarised the progress in raising the standards of efficiency and use of electricity in coalmines, to which the association dedicated its efforts in 1909, over this period. As mentioned in our personal columns last week, the president for the jubilee year is Mr A. E. Crook, C.B.E., Chief Engineer (Production) of the National Coal Board.

### Presidential Address

The president, opening his address, referred to the original objects of the association when formed by a number of far-sighted engineers in the industry who wished to raise the status of engineers and to take steps both to promote the application of electricity in coalmining and to ensure that it would be more safely applied than the then prevailing circumstances indicated. In 1909 the total output of coal was nearly 264 million tons from some 3,200 mines and of this about 5% was mechanically cut and an even smaller percentage was mechanically conveyed.

No figures were available for that year in respect of the number of mines with electrical equipment, but four years later it is recorded that 1,472 of the 3,289 mines in operation had electrical equipment totalling in aggregate about 511,000 h.p. Lighting below ground was then by 677,000 oil flame safety lamps and only 2,155 electric safety lamps with relatively inefficient 2 V bulbs. By last year coal-cutting machines had increased from 1,700 to 9,000 and compressed air for driving them had declined from 60% to below 10% in favour of electricity. The output from these machines has grown eighteenfold, while the output per machine has increased by 150%. The quantity of coal cut and loaded by machinery has risen since 1943 from 0·3% to 32% and over 800 armoured flexible conveyors are now in use at the coal face. Since 1909, the number of conveyors of all types has risen from 200 to 27,000 and, in the last 10 years, the total length of conveyors has doubled and is now about 3,000 miles, or an average of four miles per colliery.

For raising coal to the surface there has been a remarkable increase in the number of electrically driven winding engines, from 11 in 1909 to 800 out of a total of 1,400 in 1959. The use of electricity for all purposes has risen from 800 million units in 1909 to 5,451 million units in 1959, of which 81·75% was purchased from the electricity boards, the balance being generated at the collieries. In 50 years the use of electric miners' lamps has increased by 250 times, while oil flame safety lamps have declined in use to 18·5% and, of these, the majority are retained for the detection of firedamp. Illumination at the coal face is now mainly from improved type 3·5/4 V bulbs, giving a much needed higher level of lighting. There can be no doubt that, in every way, electricity has greatly contributed to increased efficiency of mining over the past half-century.

### Electricity and Safety

The increase in the use of electricity, graphically shown in Fig. 1, has been accompanied by a phenomenal reduction in accidents. A small proportion of these can be directly attributable to electrical causes such as shock, spark ignition of gases (the two most serious occurring in 1936 and 1938), but the reduction of accidents generally can largely be accountable to the better working conditions brought about by the use of electricity both for lighting and power to supplement or replace manual labour. In 1912, when 511,000 h.p. of electrical motors was installed, 1,100 persons were killed and nearly 4,600 injured below ground, of which 60 were directly attributable to electrical equipment. In 1959, with a total h.p. of 4,666,098, the corresponding figures were 329 killed and 1,872 injured, of which electrical causes were responsible for 11 deaths and 94 injuries, the second highest figure since 1938. In fact, the average figures for the past 21 years are 7·5 deaths and 73·4 injuries. In the whole period from 1909 to 1959, 361 persons were killed and 2,482 injured through electric shock, which focuses attention on steps required to eliminate these hazards.

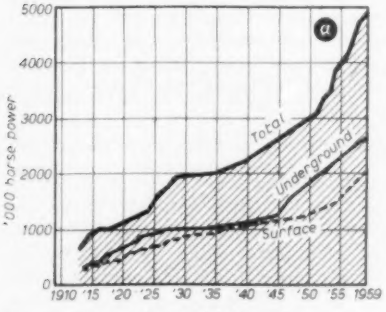



Fig. 1. Rise in electrical h.p. used in mines 1910-1959

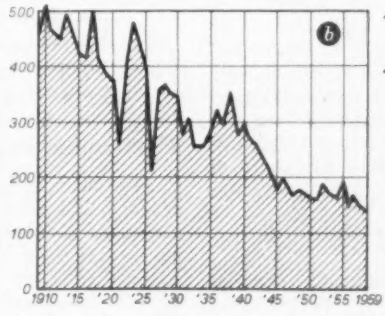



Fig. 2. Fall in number of fatal accidents in mines, 1910-1959

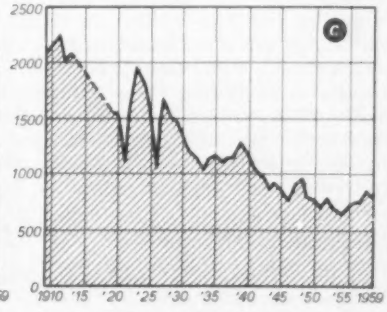



Fig. 3. Fall in number of injuries in mines, 1910-1959

The graphs in Figs. 2 and 3 show the decline of accident rates over the period in review.

It can, therefore, be said that the association, which has 24 branches throughout the coalfields in Britain, Australia and India, has been highly successful in its efforts to improve efficiency and safety in mines and to raise the status of engineers and technicians. These achievements will spur the association to even greater efforts in the future.

## The Thornton Lecture

The twelfth Thornton Lecture was given this year by Mr B. L. Metcalf, B.SC., A.R.T.C., a past-president and Director of Engineering for the NCB, who chose "Technology and the Future" as his subject. In a survey of the technological developments which had taken place during the past half-century he commented on the limited advantages that had been taken of technological advancements in the industry as a whole. Up to the end of the last war the mining industry had the excuse of the first world war and its subsequent political and economic upheavals. Some remarkable developments had taken place in the interval, however, and manufacturers had made great progress in developing new machinery and apparatus. These were only adopted by a limited number of collieries and even today the best achievements were only on a limited front. Technical progress does not always require the application of new scientific knowledge. While the value of the scientist and technologist in new fields is acknowledged, too little attention is being given to diverting their activities to the improvement of existing methods and machinery. The industry as a whole might well reap the greatest advantage by directing more activities in this direction.

In manufacturing industry the production engineer has a wide variety of materials to call on; the mining engineer has only the one. Moreover, he has no control over the quality of the material; he has to take it as he finds it and endeavour to match it to the requirements of the consumer. Geological conditions are beyond his control and there are many other uncontrollable factors with which he has to deal in his efforts to bring the product from the coal face to the surface with the maximum efficiency and safety of the operatives.

In a survey of prospecting methods, he outlined the various new methods and appliances which had recently been developed, including a nucleonic logging probe which, by a gamma-ray back-scattering technique, could locate seam boundaries to within 3 in. in boreholes 3,000-4,000 ft deep. On the subject of shaft sinking and tunnelling, he mentioned the record rate of sinking so far achieved, when 302 ft of 24 ft dia. shaft was sunk in one month at Parkside in 1958. Other aspects of his general survey included winding practices, methane drainage, coal face machines and the use of hydraulics in mining. For large winders the simplicity and reliability of the d.c. motor is bound to commend itself and this will lead to a more determined effort to perfect rectifier control, so eliminating motor generators. An urgent need is for better means of locating and anchoring tubs and mine cars in the cage, since there are too many accidents arising from these vehicles falling down the shaft or protruding from the cage.

## Methane Drainage

In one field, that of methane drainage, the engineer has made significant advances. The rate of emission varies from mine to mine. In some it is so small as to permit the use of naked lights; in others it may be as high as 4,000 cu ft for each ton of coal. Firedamp is released when coal is extracted and/or pressures around or at the coal face are relieved. Techniques have been developed for drilling gas drainage boreholes giving access to strata above or below the coal seams where the gas collects. Similar techniques have been developed for draining worked-out areas and many instruments have been devised for detecting and monitoring the flow and strength of methane-air mixtures.

## Coal Face Machines

Among the many machines for extracting coal at the face which are under development is the Durham Continuous Miner designed for extracting coal from very thin seams. The main problem with this device is the need to apply some form of steerage. Cable handling from electrical cutters and loaders are also the subject of considerable development. In an effort to achieve the completely automatic coal-cutting machine and so arrive at the ideal concept of a man-less coal face, the main problem is one of getting the power loading machine to sense the direction of the seam and automatically steer itself in that direction. One such probe has been devised by the NCB Mining Research Establishment and is to be tried out with the Continuous Miner. The principle is to measure the back-scatter of gamma rays from the floor of the coal seam to determine the thickness of coal left.

## Transport and Communications

Coal getting machinery must be backed up by an adequate transport system and in the period under review two parallel developments have taken place: long trunk belt conveyors and diesel, battery or trolley locomotives. In regard to the latter, from present experience 25 tons is the limit of locomotive weight the industry can use. Locomotive systems need a signalling system and radio communication with moving trains is now a practical proposition being developed to control a driverless train.

For other communications, radio is being used on a wider scale, but must still be considered as being in the development stage. Higher powered sets are being developed and a fully transistorised portable set will soon be available. In regard to the wider aspect of communications, these may have to be extended to the country as a whole to assist in the disposal of the daily output in the most economical manner. This, in turn, will call for data processing—which suggests computers—the programming of surface train movements and, possibly, a wide radio intercommunication network.

Concluding, the author made the comment that machines without the trained personnel to maintain and use them are merely a costly encumbrance. The association has a part to play in training these men and in stimulating their enthusiasm and interest in their work, but official recognition of the part they play is an essential factor in attracting the right calibre of man to the industry.

## Continental Practice

Two other papers, outlining aspects of mine maintenance and organisation on the Continent, were also presented. The first of these, dealing with electrical maintenance at the Netherlands State mines, was read by the authors, Ir W. E. van Os and Ir M. B. J. Kneepkens. The second, presented by Dr E. Anderheggen, described the organisation of engineering services at the Friedrich Heinrich colliery, Western Germany.

# AROUND THE TRADE

BY PEREGRIN

WITH Whitsuntide a delectable memory and Scarborough and the ECA conference temptingly before me as I write, the season flows pleasantly along. The weather is mostly warm and sunny and flaming June has occasionally lived up to its name. Yet the refrigerator trade shows little sign of recovery from the Chancellor's body blow. Washing machines, too, are still in the doldrums and spin-dryers are as dead as the dodo. There is no doubt about it, the Chancellor has achieved his end. Perhaps the traders who have felt the blow least are those who have always maintained a sensible h.p. scheme with reasonable deposit and limited payment terms. Not so the no deposit, the catch-penny and the switch sellers whose trade depends on high pressure door-to-door work. I was discussing the h.p. regulations with the proprietor of such an organisation—he has eight branches, all selling furniture, TV and electrical appliances, almost exclusively on the never-never, with an outside sales gang to bludgeon the public into buying. His reaction had been to cancel all outstanding orders for washers, dryers and refrigerators. Perhaps he was wise! There must be many electrical traders in this country who are now carrying a far heavier stock than is economic.

## E.A.W. Viewpoint

But, before I get too involved in the vicissitudes of trade, I must not forget my "serial story" from my last notes on the EAW questionnaire "Viewpoint" which is sub-titled "A Survey of the User's Opinion on Electrical Equipment in the Home." This questionnaire is in the form of a two-part brochure of some 24 pages. The first part consists of a series of pertinent questions on the type of appliances in a particular home; their value and their shortcomings. The second part covers the same range of appliances, but gives six or seven lines under each in which suggestions can be made for improvements in design and performance. Both parts are prefaced by a page which must be filled in with the name, address and occupation, type of house and of household. The equipment dealt with includes vacuum cleaners, washing machines, clothes dryers, irons, cookers, water heaters, space heating and electrical wiring, and the questions under each follow much the same pattern. On the vacuum cleaner page it is: "What type of vacuum cleaner do you use? Have you used the other type? Which do you prefer? How long have you had your cleaner? What repairs have been necessary?" and so on.

Some of the questions show interest in performance, such as, "Do clothes tangle in your washing machine?" and, in the case of the spin-dryer, there are questions on the degree of dampness of the clothes, difficulty in moving, noise, unsteadiness and rinsing.

Now much of this is good. It is useful to know whether the same troubles crop up continually on a particular type of appliance and I have no doubt that many users will mention the fact that most kettle elements need 1½ pints of water to cover them, that only nylons and the like are ready for ironing as they come from the spin-dryer, that most motor-driven appliances are far too noisy, and that what apears to be the gentlest washing action of them all, is the most destructive to the clothes. But I must confess I am puzzled by some of the questions. For instance, in both the vacuum cleaner and washer section comes the following questions: "Is a regular maintenance service available? If no regular service, would you like one?" Again, on space heating, the query: "Should more advice be given to buyers of equipment in stores and showrooms? In the buyer's own home? In descriptive leaflets?" And on electric wiring: "If you would like additional sockets, what prevents you?"—followed by five possible reasons which include cost, upheaval, making good, and landlord's permission, and a further question: "Would you take advantage of deferred payment terms for wiring if available?" I cannot help wondering what is the ultimate aim of these questions. Indeed, except for the washing machine, where the user is asked to state the make as well as the type, what use is it going to be to know that Mrs Blank's spin-dryer is unsteady in use?

## Using the Results

I suppose the results of the inquiry will be put before BEAMA in the hope that members will alter their products to suit the general trend of opinion, but I should say that that will depend on the weight of that opinion and on BEAMA. The 10% of the membership who answered the last questionnaire is insufficient evidence, and, further, I am reminded of the inquiry on boiling plates, when the vote of the ladies went in favour of two sizes of boiling plates, 6¼ in. and 8 in., to each cooker. All the new cookers now carry one size only, 8 in. So much for the user's opinion versus manufacturing costs! But it is these other questions that interest me—on service, on additions, on terms. What is the EAW going to make of these? Most manufacturers are up against the service problem as it is, and some are more than anxious to unload a very expensive advertising medium on to any service-minded dealer who will fall for it; also most dealers will arrange deferred payments on installation work to suitable applicants. But this extra wiring query. Who deals with that?

In the ordinary course of business life one would hand such an item of interest to a salesman and send him out to get an order. But surely the intention is not *sales* but education of the public, or is it perhaps all for future EDA propaganda?

Perhaps I am deeply conscious of the change that has taken place in the last few years in the work outlook of the EAW. At one time it appeared to maintain a staunchly independent outlook in spite of the fact that it ran almost entirely on grants from the electricity authority, but lately there appears to be a different atmosphere and one senses the "power" behind the throne.

In short, the EAW seems now to be on a par with the "Gas Girls" and the "Solid Women." So, I repeat, what is the ultimate goal of all this information all neatly parcelled up and labelled? I wish they would send it to me; or at least to the various interested associations and in particular to the electrical retailers.

# OVERSEAS NEWS

## from our correspondents abroad

## CANADA

### Saskatchewan Potential

Hydro-electric potential in Saskatchewan is now considered to be more extensive than earlier estimated, Mr D. Cass-Beggs, general manager of the Saskatchewan Power Corporation has told the Parliamentary Mines Committee. Preliminary studies indicate that the Saskatchewan River could be utilised from the Saskatchewan Dam project at Outlook to Squaw Rapids near the Manitoba border, where there was a drop of about 1,000 ft en route. He estimated that h.e. installations on the river could approach 4,000,000 h.p. Mr Cass-Beggs also urged the establishment of a Canada-wide power grid system—from British Columbia to Nova Scotia—a proposal which the Federal government is considering.

### Underground Lines

A ten-year programme to clear overhead power lines from the centre of Ottawa is under consideration by the Ottawa Hydro Commission. The plan will require co-operation and financial assistance from the city, National Capital Commission and down-town property owners. These will each contribute one-third towards the cost of the scheme, it is proposed. At the same time, new street lighting may be installed, financed jointly by the city and the Hydro.

### Winnipeg Results

Above average flow in the Winnipeg River permitted the Winnipeg Hydro-Electric System to sell some 92% more electric boiler energy in 1959 than was available for that purpose in 1958. This resulted in an increase of 12·7% for the year in total energy sold, compared with only 0·2% in 1958. Apart from its Slave Falls and Pointe du Bois hydro electric plants, the City Council operates the Amy St steam station and, in addition, purchased over 349 million units (25% of the system's total requirements) from the Manitoba Hydro Board. Operations for the year resulted in a profit of nearly $12,000, but as costs are increasing about 10% annually, attention is drawn to the need to provide reserves to meet unfavourable conditions.

## JAMAICA

### Conversion Costs

Cost of converting the 40- and 60-cycle installations in use in Jamaica to 50 cycles is estimated at £1¼ million, according to the Electricity Frequency Standardisation Commission in its first report. That figure, however, relates only to work on the interconnected system, which, if carried through efficiently, could probably be completed within two years. The cost of conversion, of course, is directly related to the quantities of apparatus in use and the changeover cost rises as the volume of non-standard equipment increases. Shortly after its formation in May, 1957, the Commission took steps to ensure that the bulk of electrical equipment imported into the island is suitable for use on dual frequency. The conversion work is to be carried out by a special department set up by the Jamaica Public Service Co., but who is ultimately to pay the cost has not yet been decided. The conversion at Port Antonio, to which we referred last week, was financed by the company, but only on the understanding that no precedent would be established from this for the other conversions. For the changeover regulations state that the cost is to be borne by the supply undertaking, unless the latter cannot afford it, when the Commission can be authorised by the Governor in Council to advance necessary sums. Such money is to be recovered by a surcharge on the consumers. The Jamaica PS Co. have already asked for such aid.

## SALVADOR

### Tenders Coming

The Comision Hidroelectrica del Rio Lempa (the Salvadorean Electricity Commission) which is responsible for major generating plant and the national grid in Salvador, has plans for further development. At present there is in service one generating station on the Lempa River at the Chorrera del Guayabo. Three 15 MW water-turbine generators are installed and a fourth is on the way from Japan. The commission proposes to seek tenders later this year for a 15 MW hydro-electric station to be built and installed on the outlet from Lake Guija where the storage dam and ancillary works have already been constructed. Invitations to tender will be issued to pre-qualified firms on the commission's list. About two years later the commission expects to seek tenders for more power plant and is advised to construct an 18 MW plant at the Chorrera del Guayabo. There will not be enough water to run this plant during the dry season and it is therefore proposed to supplement it by a steam plant which could be located alongside the oil refineries and other industrial installations which it is proposed to construct at Acajutla on the coast. The commission is advised that this arrangement will be the cheapest way of providing the next instalment of power; after that, further development of the hydro-electric potential of the River Lempa is contemplated.

## ARGENTINA

### Survey Report

The draft of the consultants' power survey of Argentina was recently submitted to the International Bank for Reconstruction and it is anticipated that the final report will be sent in to the Bank and the Argentina Government in the next few weeks. Consultants involved in the survey are Kennedy and Donkin along with Tippets-Abbett-McCarthy-Stratton, of New York. The object of the study, as we reported on 24 Sept. last, is to determine the amount of power to be provided during the next ten years and to draw up both emergency and long range programmes for all power systems in the country. It is the first project being undertaken for the International Bank under the Special Fund set up by the United Nations.

## RUSSIA

### Nuclear Station

The assembling of the reactor set has started at the Beloyarsk nuclear power station, named after academician Igor Kurchatov, which is under construction in the Urals. The station's capacity will be 200 MW. The reactor is a graphite cylinder, over 30 ft high and 29½ ft in diameter. Inside it are 998 channels with nuclear fuel. The reactor is surrounded by a water-filled reservoir made of iron as a protection from radioactive radiation. It also has a protective reinforced concrete layer 3¾ ft thick, and will be controlled from an underground panel 23 ft below the surface.

## NORWAY

### Scheme Approved

The further development of the Tokke-Vinje hydro-electric power project in the county of Telemark in Central Norway has been given the green light by the Norwegian Storting. It includes the building of two more power stations,

Tokke II and Tokke III with a planned capacity of 300 MW and 110 MW, respectively. The total cost is estimated to be £21,200,000, and it is hoped that a substantial part of this can be financed through a loan from the World Bank. The work is planned to be concluded in 1965. The Storting further approved the building of transmission lines from the Tokke stations and also a line from Skjeberg in south east Norway to the Swedish border intended for power export.

## GERMANY

### Nuclear Station

A domed steel cylinder which will house the reactor for West Germany's first nuclear power plant has been completed at the site near Kahl. General Electric of America is supplying the single-cycle boiling water reactor and the nuclear steam supply system for the plant, scheduled to be in operation late this year. The 15 MW station is being built by Allgemeine Elektrizitats-Gesellschaft (AEG) and the plant will be owned by Rheinisch-Westfaelisches Elektrizitatswerk (RWE), one of Europe's largest utilities, and Bayernwerk (A-G), another large utility in West Germany. Versuchsatomkraftwerke (VAK) of Kahl, jointly owned by the two utilities, will run the plant. US General Electric will provide consulting assistance and training for the VAK operators at the plant before the reactor begins working.

## S. AFRICA

### Mechanised Extensions

Mechanised gangs are to replace the handcart gangs now used by the Cape Town municipal electricity supply undertaking for making extensions to the overhead distribution network and for maintenance and repair work. An experiment carried out in two of the council's four districts has shown the cost of operating a four-man mechanised gang to be £2,250 per annum as against a seven-man handcart gang of £2,370 per annum and that only 14 mechanised gangs would be needed, compared with 24 handcart gangs at present employed. This move will save £25,000 a year, it is estimated. The City Council has authorised the purchase of a number of three-ton vehicles with turntable extension ladders at a cost of a little over £11,000 to enable the changeover to be made.

## UGANDA

### Change of Plan

A scheme has been prepared by the Uganda Electricity Board for supplying electricity to Gulu, Lira, Masindi and Hoima from the Owen Falls power station. It is an alternative to an earlier scheme for building a new hydro-electric station at the Karuma Falls in the Murchison Falls National Park. The new scheme, Mr W. D. Fenton, chairman of the board, has said, would cost about the same as building the Karuma Falls station. But on balance, it was thought better to carry power which was available from the Owen Falls. The World Bank mission which recently visited Uganda to investigate projected electricity supply schemes has agreed with this view. Application has been made by the board to the World Bank for finance for several schemes designed to serve areas which are now outside the range of the distribution network from Owen Falls. To implement the new proposal for Gulu, Lira, Masindi and Hoima, the board would have to increase the capacity of its present supply line between Tororo and Soroti from 33 kV to 66 kV. A 33 kV line would be needed from Soroti onwards to Lira and Gulu.

## INDIA

### Further $ Loan

The US Government has agreed in principle to yet another loan to India for power expansion. This time it is of just over $27 million (nearly Rs 130 million) for expansion of the Durgapur thermal power plant in West Bengal. An additional 120 MW of generating plant is to be installed, but details of the loan have yet to be completed. At present the plant has an installed capacity of 150 MW. Of the total amount, $20 million to cover foreign exchange costs of the project will be provided from the Development Loan Fund. This is the fifth DLF loan announced in recent weeks for power projects in India. The latest DLF loan will provide for the addition of two 60,000 kW steam turbo-generators and two 700 klb/hr coal-fired boilers and ancillary equipment. The power from the Durgapur project will be used in the immediate vicinity of the plant by expanding newly contemplated industries in such fields as aluminium, steel, automobiles, jute, paper and glass.

### Conversion in Delhi

By March, 1961, all the streets and bylanes in Delhi city will have a.c. mains. Consumers in the city area, the whole of which is on the d.c. system, who have been reluctant so far to convert to a.c. will next year have to pay more if they continue to use d.c. They will then also lose the present concession under which those converting to a.c. are allowed a rebate of 12½% on their bills for five years. Delhi Corporation's Electric Supply Committee has taken this decision to persuade those dilatory consumers remaining on the d.c. network. The committee has also decided that all the 350 villages in rural Delhi should be supplied with electricity gradually. This year 93 villages will get electricity.

## PAKISTAN

### More Aid

Banks in West Germany, Italy and France are giving loans to West Pakistan Water and Power Development Authority for increasing power development schemes. West German banks are giving 120 million marks (over £10 million) for the extension of the Multan power station, repayable in 12 years at the World Bank rate. Banks in Italy are giving loans to the value of $40 million (£14 million) for the Kunhar hydro project in the Kaghan valley with a stipulated capacity of 1,000 MW. Another $10 million loan will be given by French banks for general purchases. But each of these loans can only be utilised in the lending countries. The Kunhar project, to which we referred on 1 Oct., 1959, is the most important scheme in Pakistan's second Five-Year Plan. It is scheduled for completion by 1965. A power station is to be built in Hazara district on the Kunhar River.

## AUSTRALIA

### Identical Tenders

The Illawarra County Council in the industrial city of Wollongong, Australia, has received 14 identical tenders for the supply of power cables from 14 separate business firms. A council member said the matter should be brought to the attention of the Federal Government as it was obvious a cartel was operating. In view of this the Government should review its tariffs protecting local firms from overseas competition, he said.

*Routine testing on a repeater partly withdrawn from its buried housing at Sardinia—in the first installation of Standard Telephones and Cables' new small diameter coaxial cable telephone transmission system. Up to 300 circuits are available on each pair of coaxial tubes in the cable. The tubes are each 0·163 in. dia*

# Personalities *in the industry*

*Mr C. R. Waterhouse*

*Mr M. K. Gomme*

*Mr A. Preston*

*Mr G. W. Anderson*

*Mr G. G. Kitchener*

The new president of the Electrical Contractors' Association—who was installed at the annual conference on Tuesday—is **Mr C. R. Waterhouse,** J.P., managing director of the Sheffield firm of C. R. Waterhouse Ltd. He started in business on his own account as an electrical contractor and retailer in 1925, after serving an apprenticeship with W. E. Burnand and Co. and subsequently gained wide training and experience with that firm. A J.P. for Sheffield for the past six years, Mr Waterhouse has served on the ECA council since 1951 and on the executive committee from 1956. He was chairman of the Sheffield branch for 1959-60 and has served on the Northern Counties Sectional Board continuously since 1945, being chairman of that board from 1953 to 1955.

W. T. Glover and Co. Ltd. announce four new appointments. **Mr W. R. Gibb,** C.A., financial director, and **Mr E. P. G. Thornton,** A.M.I.E.E., technical manager, power cables, have been appointed joint assistant general managers. Mr Thornton has also been elected a director of the company. **Mr J. V. W. Richards,** who was formerly general production manager, becomes works manager, and **Mr D. H. Booth,** who was previously chief cable design and development engineer, becomes technical manager, power cables.

After 40 years as chief of the Guildford electricity undertaking, **Mr W. E. Affleck,** M.I.E.E., M.INST.F., is to retire at the end of this month. He could have retired some years ago, but has carried on there to see the completion of the new offices, stores and workshop building, which was formally opened by the Deputy Mayor earlier this month. (We reported on 26 Nov. last Mr Affleck's intention to retire, when we also reported the appointment of **Mr I. R. Galloway,** A.M.I.E.E., as the new manager of the Guildford district of the South Eastern Electricity Board.) At the opening ceremony, the Deputy Mayor of Guildford, Ald C. E. Nicklin, said: "We have been fortunate that during the last 40 years the undertaking has been under the guidance and control of a great chief who has had the backing of a wonderfully loyal and efficient body of men." Mr Affleck became chief engineer and manager there in 1921 at the age of 28 when Guildford Corporation took over the undertaking, and thanks to his keen business acument in negotiating favourable bulk supply charges, the town boasted very low tariffs. After vesting day he continued as district manager.

Formerly divisional manager of the South Eastern Division of Electrolux Ltd., **Mr Maurice K. Gomme** has been appointed to the general sales manager's staff at the company's head office in Regent St. Succeeding him as divisional manager is his former deputy manager, **Mr Alexander Preston.** The latter's former position will, in turn, be taken over by **Mr G. W. Anderson,** formerly assistant to Mr F. L. Woodcock, manager of the company's London Division. His successor is **Mr E. A. Harding,** previously an area manager with the company's Western Division. In addition, **Mr W. Buck,** formerly an area manager in Electrolux Ltd.'s Liverpool and North Wales Division, has been appointed manager of the Yorkshire and North Lincolnshire Division. Mr Gomme, who is aged 43, joined Electrolux Ltd. in 1948 as a contracts representative in the Midlands and was later appointed contracts manager at head office. In 1954 he was appointed deputy manager of the company's former South London Division and in 1955 he became manager of the South Eastern Division on its formation. Educated at Watford Grammar School and St. Albans School, Mr Gomme began his career in the electrical industry with J. W. Russell Ltd. of Watford in 1932. In 1935 he joined Harry Smith Ltd., St. Albans, to whom he returned as radio and electrical manager after war service with the Bedfordshire and Hertfordshire Regiment, in which he reached the rank of captain. Mr Preston joined Electrolux Ltd. in 1950 as a sales representative in London and was later promoted as an area manager. He was appointed deputy manager of the company's South Eastern Division in 1956. Born in Calais, he was educated at the College Commercial St. Germain en Laye. After war service he began his business career with the former Amplifier, Illumination and Appliance Co., Wolverhampton.

Previously with Midland Silicones Ltd. **Mr D. J. Dowling,** B.SC.(ENG.), has joined Jones, Stroud and Co. Ltd., to be responsible for the electrical insulation side of the company's business and operating from the new London office at 7-8 Market Pl, W.1.

Technical director of the London electrical contracting firm of F. H. Wheeler and Co. Ltd., **Mr G. G. Kitchener,** ASSOCIATE I.E.E., has been elected chairman of the Association of Supervising Electrical Engineers, in succession to **Mr C. G. Aldridge.** Mr Kitchener served an indentured apprenticeship with the old Cubitt Car Co. at Aylesbury, and completed training with Richard Hunt and Co. After a short time with the Air Ministry Works Directorate and London contractors he joined his present company, F. H. Wheeler and Co. Ltd., in 1932 as an electrician, becoming chargehand in 1934 and foreman in 1936. In 1939 he was appointed area engineer for London and Home Counties and during the war was responsible for electrical work on several RAF and Fleet Air Arm stations. In 1945, in the position of manager, he opened the West of England office for his company, returning to the London office in 1947 to take up the appointment of senior engineer. In 1954 he was appointed chief engineer of the company and invited to join the board as a technical director in 1956, which position he still holds. Mr Kitchener has been a member of the ASEE since 1941, and is a past-chairman of the South West London branch. In 1953 he was elected to the executive council, continuing to serve to the present time, with a break of one year only, and he is also a member of several of the association's principal

committees and a founder member of the council of management of the Electrical Engineers' Exhibition. He also represents the association on the BSI committee for mineral cable glands and seals and acts as an adviser on the ASEE Diploma Scheme examinations.

Chief resident engineer for the construction of the 150 MW nuclear power station at Tokai-Mura, **Mr K. A. Lowe**, B.SC.(ENG.), A.C.G.I., A.M.I.MECH.E., recently left London airport for Japan to take up that appointment. He was accompanied by **Mr R. D. Harvey**, A.M.I.MECH.E., who is also taking up the post of deputy chief engineer (electrical and mechanical) of the British General Electric Co. of Japan Ltd. The latter is building the station for the Japan Atomic Power Co. and also acting as the link between the GEC and Simon-Carves Atomic Energy Group in this country and the main sub-contractor in Japan, Fuji Electric Manufacturing Co. With the arrival in Japan of Mr Lowe and Mr Harvey, the British staff there now numbers 22. The other senior members are: **Mr R. J. Smith**, M.SC.(TECH.), A.M.I.E.E., who is director and manager; **Mr C. A. H. Bird** is the assistant manager (commercial); **Mr I. A. B. Gaunt**, B.SC.(ENG.), A.M.I.MECH.E., A.F.R.AE.S., is chief electrical engineer (electrical and mechanical), and **Mr F. W. Evans**, M.I.C.E., M.I.STRUCT.E., is chief engineer (Japan) Simon-Carves. Mr Smith was educated at Manchester College of Technology and served with the RAFVR during the last war. He became a senior engineer in the development laboratory of Salford Electrical Instruments Ltd. in 1947 and was appointed assistant works manager of the Hazel Grove works in 1952. In 1955 he took up the position as head of the instrumentation and control section and, after that, chief projects engineer of the GEC and Simon-Carves Atomic Energy Group. Mr Bird earlier served with the Imperial Tobacco Co. and Mitchell Engineering before joining GEC in 1957 as head of the commercial section of the company's Atomic Energy Division. Mr Gaunt was educated at Ardingly College and then served in the Royal Navy as an air engineer officer. His engineering education was completed at Brighton Technical College from which he obtained an external Honours degree of the University of London. After a period at the de Havilland Engine Co. Ltd. and the Plessey Co. Ltd. he joined GEC in 1955 and in 1958 was appointed head of the Projects Section of the Atomic Energy Division. Mr Lowe was educated at Haberdashers' Aske's school, Hampstead and Imperial College, London University. After serving in the Royal Navy from 1943 until 1946 he took up an appointment with the English Steel Corporation, Sheffield. In 1951 he joined Esso Petroleum Co. Ltd., finally being appointed resident engineer at their Fawley Refinery, Hampshire. He joined GEC in 1959. Mr Evans was previously resident civil engineer and deputy chief resident engineer at Hunterston nuclear power station from 1956. He has held various positions with the Hastings and Bristol Corporation Electricity Departments, the South Wales Division of the former Central Electricity Authority and L. G. Mouchel and Partners. Mr Harvey received his technical education at the Royal Technical College, Glasgow, graduating in 1950. He held positions with John Brown and Co. Ltd., and constructors John Brown Ltd., before joining GEC in 1956. In 1958 he was appointed chief mechanical engineer, Thermal Stations Group, Power Plant Division, which he has now relinquished on taking up his new post.

*Mr K. A. Lowe*

*Mr R. D. Harvey*

*Mr R. J. Smith*

The appointment of **Mr. Oscar M. Mansager** as deputy chairman of Hoover Ltd. was announced last Thursday. Mr Mansager has become increasingly active in the international operations of the company in recent years. It is contemplated that he will devote even more of his time in the future to forward planning and world-wide development. The appointment will also provide closer liaison between Hoover Ltd. and the American company. It does not affect the day-to-day operations of Hoover Ltd., which will continue under the direction of **Mr Sidney Roberts** as managing director. Mr Mansager is a director and executive vice-president of the US parent company and has been a director of the UK company since 1954. He is also a director of the Hoover Co. Ltd., Canada; Hoover Inc.; and Hoover (America Latina) SA in South America; and Hoover Electronics Co., USA. He joined the Hoover Co. in 1922 in the sales department, and after subsequent promotions became vice-president, sales, in 1952, and joined the board of directors in 1953.

Formerly with Sunbeam Electric Ltd. **Mr A. F. McCutcheon** has joined Kenwood Manufacturing (Woking) Ltd. as area sales manager.

London manager of Connollys (Blackley) Ltd., **Mr F. J. Clifton**, is retiring at the end of this month on account of ill health, after 31 years' service with the company—he has been London manager for the whole of that period. Prior to joining Connollys he served with Callender's Cable and Construction Co. for over 17 years.

**Mr D. G. Hawkins**, A.M.I.E.E., has been appointed to be responsible for the computing services of the Central Electricity Generating Board. This appointment follows a decision by the full-time members of the board to introduce centralised control over their computer services for all departments so that work done on all computers can be effectively reviewed and that decisions can be made on the

*Mr C. A. H. Bird*

*Mr I. A. B. Gaunt*

*Mr F. W. Evans*

*Mr O. M. Mansager*

*Mr F. J. Clifton*

*For his services in connection with the construction of the Aswan hydro-electric generating station, Mr C. A. Stephens, a director and late overseas manager of A. Reyrolle and Co. Ltd., was awarded the Commander Order of the United Arab Republic by President Nasser, and was recently presented with the decoration by the Charge d'Affaires of the United Arab Republic in London. Our photograph alongside shows Mr H. H. Mullens (right) chairman and managing director of Reyrolle's, admiring Mr Stephens' decoration*

allocation of work to the machine best suited for it. The responsible officer will be charged with extending the application of equipment so that it can be progressively used to greater capacity. He will be directly responsible to **Mr L. Rotherham,** the board member for Research and Development. Mr Hawkins will be located at Bankside Hse, Sumner St, S.E.1.

Secretary of the Yorkshire Division, CEGB, since April, 1948, **Mr C. F. Walkland** retires on 30 June after 47 years' service in the industry. (*ESH, page 71.) He started his career with the Sheffield Corporation Electric Supply Department and, after war service, began studying at Sheffield University, being awarded an Associateship in Engineering in 1925. In 1929 he moved to Leeds as chief clerk of the Mid-East England area of the Central Electricity Board and later became chief clerk of the combined Mid-East and North-East England areas. He held this position until 1 April, 1948, when he was appointed divisional secretary of the Yorkshire Division.

Chief engineer and manager of the Engineering Division of the Crittall Manufacturing Co., **Mr J. S. Brichieri-Colombi,** D.F.H., A.M.I.E.E., has been appointed a member of the Eastern Electricity Consultative Council.

**Mr L. Bagrit** has retired from the board of Southern Areas Electric Corporation Ltd.

**Mr F. Webster** and **Mr C. G. Maynard** have been appointed directors of Engineering and Lighting Equipment Co. Ltd.

It was officially announced last Thursday that the **Rt Hon Alfred Robens,** M.P., has been appointed a deputy chairman of the National Coal Board as from 1 Oct. next, and he will succeed **Sir James Bowman,** K.B.E., as chairman of the board on the latter's retirement at the end of January, 1961. The announcement thus confirmed earlier reports which had stimulated criticism of such an appointment in certain quarters. Mr Robens, who is 49, served as Parliamentary Secretary to the Ministry of Fuel and Power in the Labour Government from 1947 to 1951. Earlier this year he became labour relations adviser to the Atomic Power Constructions for the Trawsfynydd nuclear power project. Mr Robens has been M.P. for Blyth, Northumberland, since 1950, a seat he will now relinquish.

Four new appointments in the Electrical Appliance Division of Charles Colston Ltd. have been announced. **Mr N. J. Morris** has been transferred from the Colston Group's Tallent/Minibrix Division to become contracts manager of the Electrical Divisions of the southern branch, and in the northern branch **Mr L. G. Napper** becomes district manager of the Merseyside and North Wales district. **Mr K. E. Sharples** is to fill the new post of electricity board liaison manager for the north western district and **Mr W. R. Hunter** has been appointed district manager for the North Scotland district.

**Mr A. C. Main,** of Associated Electrical Industries (Manchester), has been re-elected chairman of the Committee of British Employers' Operating Abroad. **Mr R. E. Leapingwell,** a director of Aiton and Co., has been re-elected vice-chairman. **Mr P. Archer,** of Simon-Carves, has been elected treasurer. The committee supplies member companies with information of labour conditions abroad.

We are now able to reproduce below the portrait of **Mr L. W. G. Mason,** A.M.I.MECH.E., whose appointment as resident site engineer for the Dungeness nuclear power station we noted last week.

**Mr J. A. Mason,** C.B.E., M.M., M.I.E.E., C.G.I.A., director of production, Automatic Telephone and Electric Co., has been elected first president of the Merseyside branch of the British Institute of Management.

**Mr I. A. Ross,** secretary and a director of Kerry's (Great Britain) Ltd., has been elected chairman of the council of the Corporation of Secretaries for the session 1960-61. **Mr A. G. V. Herbert,** secretary of Bakelite Ltd., has been elected deputy chairman.

**Mr V. G. P. Weake** has become chairman of Doran Instrument Company, manufacturers of scientific and electronic instruments. **Capt J. D. Mansfield-Robinson** has also joined the board. Mr Weake is chairman of Derritron of which Doran is now a subsidiary. **Mr W. E. Doran** remains managing director of Doran Instrument Co.

Formerly London representative, **Mr B. Wright** has been promoted to sales manager of John Thompson Instrument Co. Ltd.—one of the John Thompson Group. He joined that company two years ago, being previously with Dewrance and Co. Ltd. as their technical representative in Manchester and Birmingham.

**Mr T. H. Kelsey,** M.A., M.I.E.E., who was appointed assistant general manager of the Witton Engineering Works of the General Electric Co. Ltd., in October, 1958, has now been appointed deputy-general manager to **Mr J. J. Gracie,** director of the company, and general manager of the Witton Engineering Works. Mr Kelsey has been with GEC since 1929 apart from the period 1942 to 1947 when he was with the Ministry of Supply, latterly as deputy director, DIEE Machine Tool Control, and subsequently as Director of Disposals. In 1955 he was appointed technical assistant to Sir Harry Railing, and in 1958 was acting as personal assistant to Mr A. L. G. Lindley.

**Mr H. K. Douglas,** M.A., F.C.A., has been appointed an additional director of Hackbridge Holdings Ltd. to fill the vacancy which arose on the death of the late Mr E. W. Farr.

An unfortunate error occurred on page 980 of our 16 June issue in the report of the visit to Portishead "B" power

*Mr T. H. Kelsey*

*Mr L. W. G. Mason*

*Mr B. Wright*

* *Denotes revision to the "Electricity Supply Handbook, 1960."*

*Mr W. C. Spooner, left, administrative assistant to the Electrical Development Association for 35 years, is presented with an electric cooker by Mr J. I. Bernard, director and secretary, on retiring recently. The Belling cooker was subscribed for by Mr Spooner's colleagues*

station. **Mr A. C. Thirtle,** A.M.I.C.E., A.M.I.E.E., M.INST.F., under whose direction the design and construction of the station was carried out, is now, of course, Regional director of the Southern, South Western and South Wales Region of the CEGB. It was **Mr J. Irlam,** who assisted him, who retired last August. We offer our apologies.

Philips Nottingham branch manager since 1940, **Mr N. R. Law** has retired, and at a luncheon party recently he was presented with a cheque subscribed for by his colleagues.

Chief engineer of the Yorkshire Electricity Board, **Mr J. D. Nicholson,** B.SC., M.I.E.E., has been elected vice-chairman of the Yorkshire Council for Further Education.

**Mr A. Walmsley,** A.A.C.C.A., accountant of the Chilterns sub-area of the Eastern Electricity Board, retired last week after nearly 30 years' service in the industry (*ESH, page 106).

**Mr J. C. Nutter** and **Mr R. Y. Parry** have joined the board of Isotope Developments Ltd., a member of the Elliott-Automation Group. Mr Nutter is a director of Elliott Nucleonics Ltd., another company in the group and Mr Parry, who has been with Isotope Developments for a number of years, is the manager of the company's works near Aldermaston.

After 23 years as manager of the machinery department (southern area) of Thos. W. Ward Ltd., **Mr W. S. Cliffe** retires from the post on 30 June. He began his career in the company's head office at Sheffield in 1913 and was for seven years responsible for the Midlands area before coming to the London office. He continues to serve in an advisory capacity until 31 Dec. and is succeeded in his appointment by **Mr C. R. Harkcom,** another old servant of Ward's and formerly general manager of their Indian company in Bombay.

Head Wrightson and Co. Ltd., announce the following appointments among their subsidiary companies: **Mr J. G. Allen** as managing director of Head Wrightson Steel Foundries Ltd.; **Mr G. Jones** to be managing director of Head Wrightson Stampings Ltd.; **Mr W. H. Mather** as managing director and **Mr G. Gowthorp** as commercial director of the Head Wrightson Machine Co. Ltd.; and **Mr T. H. Stayman** as managing director of Head Wrightson Iron and Steel Works Engineering Ltd.

**Mr W. J. Foster** has been appointed a director of the Dubilier Condenser Co. (1925) Ltd.

## OBITUARY

**Mr W. E. Brandreth,** A.M.I.E.E., who was prominently associated with Wessex electricity undertakings, died on 13 June, aged 84. He was general manager of the Wessex Electricity Co. from 1929 until retiring early in 1943, during which time that company expanded from an undertaking with only 400 consumers to one with over 133,000 consumers in 1,149 towns and villages. That expansion included a considerable amount of rural electrification work. He had also been chairman of the Stroud Electric Supply Co. and a director of the Ilfracombe Electric Light and Power Co., the Salisbury Electric Light and Supply Co., and the Wilton Electricity Supply Co. Ltd., all concerns in the Edmundsons Electricity Corporation group.

**Mr F. C. Archer,** superintendent of the Winding Department of the Witton Engineering works of the General Electric Co., has died aged 62. He joined the works in 1937 as assistant superintendent of that department and he introduced many new features in the winding and manufacture of electrical machines, being extremely interested in new developments. He played an important part in the application of direct-coiled windings for large alternator rotors and stators and, in the field of traction, acted jointly with the late Mr G. H. Fletcher in producing the Fletcher-Archer armature coil.

**Mr H. St. J. de A. Donisthorpe,** formerly deputy manager of the Valve and Electronics Department, General Electric Co. Ltd., died suddenly on 15 June, aged 66. Since his retirement just over a year ago he had acted as a sales consultant to Whiteley Electrical Radio Ltd. and he had also continued to be active in the affairs of the EIBA (of which he was chairman of the Finance Committee) and the Electrical Industries Club.

**Mr G. W. Cole,** M.I.E.E., formerly of Munnar, Travancore, died at Brighton on 15 June.

**Sir Francis Brake,** who died on 13 June, aged 70, was chairman of Creed and Co. Ltd., vice-president and director of International Standard Electric Corpn, a director of Standard Telephones and Cables Ltd. and Standard Telecommunication Laboratories Ltd. and other concerns.

**Mr H. W. Drury,** a joint founder of the Torquay electrical firm of Drury and Chaffe, has died aged 80. He retired some time ago and, in 1941, the business became Drury and Co.

**Mr R. Nelson,** M.I.E.E., M.I.MIN.E., who died on 16 June, aged 85, served with Merz and McLellan for several years, during which time he was responsible for the design of the first Carville power station, and was subsequently a partner in McLellan and Partners for almost 20 years. He joined Merz and McLellan in 1900, but left in 1907 to devote practical attention to the applications of electricity in works and coal mines. He was a member of the Home Office Committee on Electricity in Mines in 1910 and was for ten years HM Electrical Inspector of Mines. He was a member of various BESA committees from 1912 to 1914 and also served on the Board of Trade Committee on Explosions in Street Mains in 1914. In addition he was chairman of the Galloway Water Power Co. and a director of many other electricity supply companies at the time of nationalisation. The latter concerns included the British Power and Light Corpn., North Wales Power Co., and Southern Areas Electric Corpn. Ltd.

**Mr A. A. Nimmo,** A.M.I.E.E., formerly engineer to the Bedford district of the Eastern Electricity Board, died on 19 June, aged 69. He retired four years ago, having served at Bedford from 1925. Earlier he had been with the Newcastle upon Tyne Electric Supply Co., British Insulated Cables Ltd. and Mavor and Coulson. He had been a member of the EPEA since 1923 and was a past chairman and secretary of the Bedford Section.

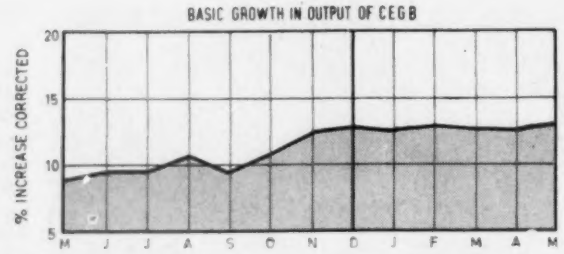
**Mr F. P. Egerton,** C.B.E., M.I.E.E., formerly general manager of the Central Electricity Board of Malaya, died on 17 June. He retired in April, 1953, after nearly 27 years' service, first with the Electricity Department of the Government of Malaya, and subsequently with the CEB there. Mr Egerton first arrived in Malaya in September, 1926, and was appointed assistant electrical engineer, Seremban, in what was then a branch of the Public Works Department. By the time of the Japanese Occupation Mr Egerton was the acting senior electrical engineer, Selangor. During the war years he served as acting electrical engineer-in-chief in Nigeria and later with the Malayan Planning Unit. It was during this period that the plans for Connaught Bridge power station were made. As a Colonel in the British Military Administration Mr Egerton was in charge of electrical services during that period and later was appointed Director of Electricity for the Federation. On the formation of the board on 1 Sept., 1949, he became deputy chairman and general manager of the Central Electricity Board, Federation of Malaya, retiring in April, 1953. In recognition of his services to that country he was appointed a C.B.E. in that year.

# POWER SUPPLY

## Statistics for May

NOWHERE on the supply systems of Great Britain was new generating plant commissioned during May; a dull statement that no doubt hides much hard work in accelerated overhaul and maintenance to tightly planned programmes. However, it is a circumstance that must divert attention in this page to the trends in electricity demand rather than the usual subject of the equipment for supply. There is one minor event to record—the North of Scotland HEB took a 75 kW set out of commission at the Mallaig station.

Generation by the CEGB during May totalled 8,162 million units, of which 7,665 million was sent out. The North of Scotland HEB generated 154 million units, all by water power, and used so little in stations that nominally the same sent out figure stands in the statistics. The South of Scotland EB returns 460 million units generated, with 432 million sent out. Interchange between the boards involved the North of Scotland HEB giving a net export of 24 million units to the South of Scotland EB, something over 4% higher than for the same month last year. The South of Scotland EB in turn was a net importer from both the North of Scotland HEB and the CEGB, though the import from the latter board was nearly 60% down on the same month in 1959.




Generation at UKAEA nuclear stations during April, now available, totalled 145·6 million units (actually for the four weeks ended 30 April), an increase of 69·3% over the corresponding period of 1959.

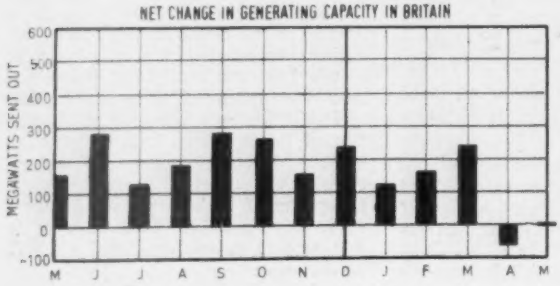
The curve of basic growth of output of the CEGB shows that the rate of annual increase continues to grow. Over the period from a year ago, it has increased markedly faster than would be required to maintain the doubling in ten years basis, but this is to some extent offset by earlier falling back. There is evidence in the statistics that industry is also increasing its own generation to something like the same extent. Reported output of industrial generating stations during April (excluding UKAEA stations) was 844·7 million units, compared with 759·9 million.

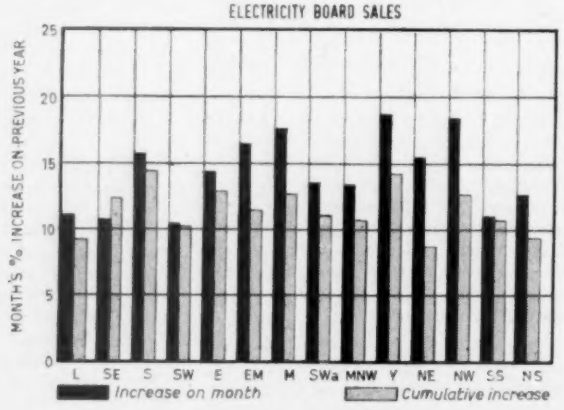
Fuel breakdown for public generation, a topical subject this week, shows 3,555,000 tons of coal burnt for public supply purposes during May, compared with 3,289,000 during May, 1959. That makes an 8·1% increase for 14·5% more electricity generated. Oil burning is up by 35·2%, having increased from 312,200 tons to 422,000 tons.

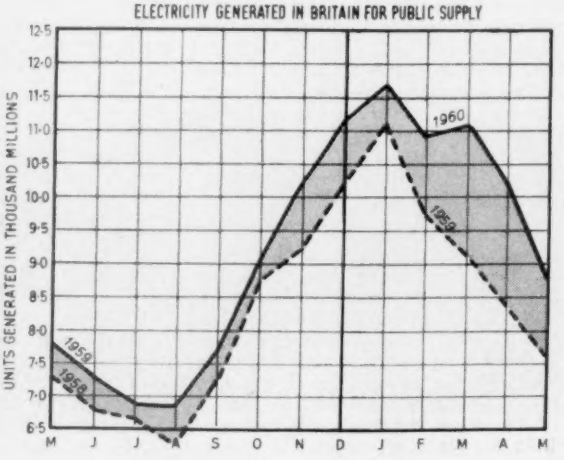
**Electricity Board Sales Progress in May**

| Board | Electricity sent out in millions of units | % increase on May 1959 |
|---|---|---|
| London ... ... ... ... ... | 612·6 | 11·2 |
| South Eastern ... ... ... ... | 439·8 | 10·5 |
| Southern ... ... ... ... | 594·7 | 15·5 |
| South Western ... ... ... ... | 277·3 | 10·2 |
| Eastern ... ... ... ... ... | 729·3 | 14·4 |
| East Midlands ... ... ... ... | 633·0 | 16·4 |
| Midlands ... ... ... ... | 823·0 | 17·7 |
| South Wales ... ... ... ... | 484·4 | 13·8 |
| Merseyside and N. Wales ... ... | 492·4 | 13·5 |
| Yorkshire ... ... ... ... | 812·1 | 18·8 |
| North Eastern ... ... ... ... | 473·2 | 15·2 |
| North Western ... ... ... | 812·6 | 18·4 |
| Direct supplies by CEGB ... ... | 305·9 | 11·2 |
| CEGB Total ... ... ... ... | 7,490·3 | 15·0 |
| South of Scotland ... ... ... | 569·2 | 11·2 |
| North of Scotland ... ... ... | 121·7 | 7·7 |

Table excludes area board purchases from other sources



# CIGRE 1960

## Power System Operation
## Insulation
## Direct Current Transmission

IN Paris last week there commenced the eighteenth international conference on large electric systems. During the next few weeks we shall review the more important papers presented and the questions discussed. In this article we deal with the meetings held last week, two of which, direct current and insulators, were not considered at the last meeting in 1958.

## Power System Operation

EMPHASIS at this year's discussion on power system operation has moved away from the control of load and frequency between large interconnected systems—a feature of several previous sessions—to improving the performance of networks under transient conditions and finding ways and means of estimating future expansion of systems in terms of the many variables involved by using computer techniques.

At variance with established techniques for dealing with transient instability, generally based on automatic regulation of the terminal voltage, was the scheme described by MR EASTON and MR PARTON (UK) in which overriding control of alternator excitation was governed by rotor or load angle. A signal derived from the angle of lag between the rotating field and the alternator terminal voltage was used to control the excitation, increasing the terminal voltage when the rotor angle, and therefore the tendency to fall out of step, increased.

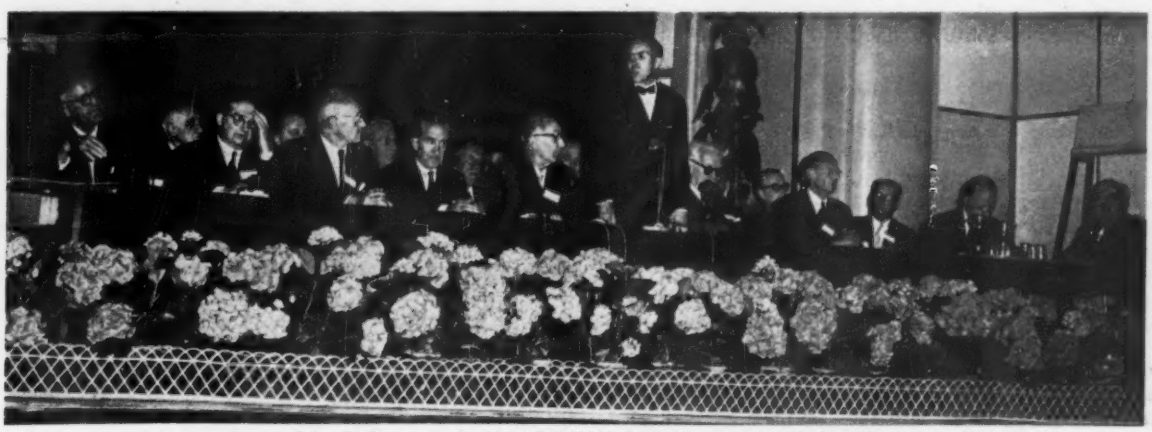
Steady state and transient tests on a 60 MW alternator operating at low load and virtually acting as a synchronous condenser confirmed that operation was possible with angles approaching 135°, or considerably in excess of the constant field current limit of 90°. The signal proportional to rotor angle is used in conjunction with a modern quick response regulator without dead band. The effect of the regulator met the primary stability requirement put forward by MR CONCORDIA (US), namely to increase the machine terminal voltage in an attempt to maintain synchronism during transient operation.

The effectiveness of using first and second derivatives of rotor load angle in the feedback circuit of voltage regulators as a measure of improving the steady state stability of a synchronous machine was described by MR LANGER (Sweden), although he thought that control by load angle alone would not be practicable without additional voltage control. Using the derivatives, tests have been carried out in Sweden with a 55 MW water wheel alternator connected to a 200 kV, 480 km line. Although only a slight increase in stability was obtained under these conditions, it was thought possible that improved equipment would give better results.

The value of overriding rotor angle control was confirmed by MR POWELL (GB), who described tests carried out by the CEGB on fault clearance. He further suggested that rotor angle control might be preferable to derivative control of terminal voltage.

Another attack on the problem of operation under conditions of either steady state or transient stability was described by MR KOSTENKO (USSR). Referred to as boost regulation, the system used the variation in either frequency or its first derivative, rather than load angle to give stable operation. The term boost regulation was used because, in one design, a rotary booster is connected in series with the main exciter armature and it was on this booster field, with its relatively small time constant and quick response, that automatic voltage control was effected. The method had been extended to mercury arc rectifier excited generators, and on the Volga-Lenin system, with its large hydro-electric generators, remarkable results are quoted for a steady state limit of 730 MW for a 700 km 420 kV line.

Improvement of system stability by using series capacitors, although providing a powerful method, lead to line overloading. Care had to be taken in using series capacitor compensation to assess carefully their relative



*A view of the platform at the opening of the 1960 Conference on Large Electrical Systems*

cost compared with new lines. MR NORLIN (Sweden) said that it was not economical to compensate line reactance by this means to more than a certain extent due to line loading and losses. Series compensation of 50 to 55% was, however, economically and technically sound. Though it entailed an increase in investment costs it provided a solution to the disadvantage of a single generating station at the end of a long line with consequent poor voltage distribution.

## Fluctuating Loads

The problem of large industrial fluctuating loads was becoming of increasing importance not only because of the growth of loads such as electric arc melting furnaces, but also because more and more consumer's equipment was becoming sensitive to them. Television sets and lighting installations were both subject to irritating flicker and such fluctuations also affected electronic equipment and digital computers.

The CEGB were actively considering possible ways of reducing such voltage fluctuations, for the steel industry were installing furnace banks, typically with six furnaces each rated at 40 MVA. MR CASSON outlined new standards for voltage variation permissible with such loads and based on voltage rather than short-circuit levels. Thus, at 66 kV the tolerance on voltage variation would be 1% with a short-circuit level of 1½ MVA while at 275 kV the voltage tolerance would be ½% with a corresponding short-circuit level of 15,000 MVA. Consumers were being asked to give estimates of the maximum power swings that their furnaces will give. The outcome of an American inquiry into load fluctuations was of great interest. In England, experiments carried out with a compensating device consisting of a shunt connected transductor in parallel with a fixed capacitor were giving encouraging results. This used the capacitor current to compensate for falling reactor current, so giving a constant voltage drop. The circuits have proved to be very successful on a 500 kVA furnace.

The American report suggested that fluctuations in power flow through the tie-line between large interconnected systems is not necessarily an indication of poor service quality and efforts to reduce power tie-line fluctuations of this type may not really have been justified.

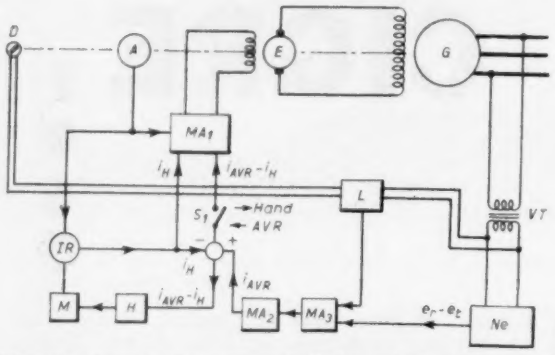
Reduction of flicker by using a synchronous condenser with rectifier excitation was claimed by one speaker to give a great improvement, though at the price of a 1·8% reduction of the plant efficiency.

## System Planning

Increasing attention was being given to the planning of future power systems by using digital and other computing techniques to obtain optimum system performance, not only financially but also in terms of plant rating and disposition.

Commenting on an American report describing the use of the strangely named techniques, operational gaming and Monte Carlo methods, to obtain a complete planned power system developments over a period of 20 years, MR PELISSIER (France) said that E de F had employed operational research for system planning but that they had encountered difficulties in taking into account river flow and other factors affecting hydro-electric station performance.

MR SELS (USA) said that the method developed took into account all historical factors involved in the expansion of a system. The technique first evolved a generating network giving the disposition of power stations, then proceeded to planning transmission systems.




*Schematic diagram of a continuously acting voltage regulator with additional rotor angle control*

| | | | |
|---|---|---|---|
| A. | 400 Hz homopolar pilot alternator. | MA1. | Main magnetic amplifier. |
| B. | Rotor angle transmitter. | MA2. | Second stage magnetic amplifier. |
| E. | Main exciter. | MA3. | First stage magnetic amplifier. |
| G. | Main alternator. | M. | Hand induction regulator driving motor. |
| H. | Hand follow-up circuit. | Ne. | Neon tube voltage reference circuit. |
| IR. | Induction regulator. | VT. | Voltage transformer. |
| L. | Rotor angle limiter. | S1. | Hand/auto changeover switch. |

Steady state stability was becoming of increasing importance and in the States it was considered relatively more vital than increasing system size. So said MR CONCORDIA (US) in discussing the use of computers in system design. Although analytical ideas are valuable, he pointed out that the computer needs actual situation details. A predicition that in a year or two's time E de F would be using digital computers for network planning was made by MR GAUSSON (France). MR FAVE (France) considered micro-peseau systems as the best method of system planning and at present they were being developed with analogue techniques for representing machine governors.

A simple and relatively inexpensive scanning device, designed for adding to an existing analyser, was described by MR KENDALL (GB) for adjusting the power output of a.c. network analysers. MR AYLETT (GB) thought that in a few years, large scale digital computers would take over from the micro-systems as the preferred method of system planning and MR GUPTA (GB) outlined work on digital computer programming at Queen Mary College using sub routines to allow for auto-voltage regulating, governing and damping for systems with up to 20 machines.

Simplicity, speed and low cost of d.c. circuit analysers for the approximate evaluation of differential losses in transmission networks were described with their application to the Irish power system. It was claimed that the method gave best results when impedance angles were fairly uniform and it assumed that the superposition principle could be applied to active power as well as current.

Power transfer between large systems through relatively small tie-lines was not a problem in Britain with its highly interconnected grid, but it remained an active question with many overseas countries, especially America and Scandinavia. In introducing the discussion on tie-line control, MR MAGNIEN (France) commented that although several theoretical papers had been submitted which were of scientific interest, they did not contribute a great deal to improved power-frequency control on large networks and he wondered if this subject was not now nearly exhausted. Several speakers suggested that absolute frequency control was not the vital criterion that it had once been thought. The importance of governor dead bands was raised by MR POWELL (GB). He said tests had shown that in general steam valves lacked speed of control,

giving oscillations on the system, and he asked whether any countries had fitted electric governors to turbines. The importance of the governor deadband was also underlined by MR CONCORDIA (US), who added that generating capacity rather than system load should determine the frequency bias used in tie-line control.

## Insulators

THE pollution of insulators was the predominant subject of discussion in this section and experiences in different countries had many common factors. All agreed that the greasing of insulators provided a solution despite its obvious difficulties, but differences arose as to whether petroleum jelly or silicone grease, hard, not soft, was to be preferred. There was ample testimony to the efficiency of water washing.

What appears to be something of a major step forward is the securing of some measure of agreement between artificial methods of testing, and it has been the lack of such correlation that has inhibited development in the past. In a report of the study committee on insulators five methods of artificial testing in various countries were described and reference made to a co-operative test programme. In the discussion DR FORREST reported that on insulators submitted for test by the five methods, good correlation was obtained between four out of the five methods. They were now in a position to say that reliable artificial tests on the performance of insulators were available. He referred also to the new pollution a.c. and d.c. test station set up at Brighton, made necessary by the increasing number of coastal power station sites. MR G. REVEREY (Germany) suggested a test which involved subjecting the insulators to natural pollution and then exposing to artificial fog in a laboratory. He confirmed the conclusion reported in his paper describing work in Westphalia that good correlation between field and artificial pollution tests could be obtained.

MR P. O. GESZTI (Hungary) in his paper suggested that silicone grease may be necessary in areas of chemical contamination, and off-load water washing was suitable for dealing with grit, but in the discussion he put forward the suggestion that if they had to use grease, insulators should be specially designed for that purpose. Water washing as carried out on 275 kV gear at Carrington was outlined by MR CONNON; use is made of a special trolley supplied with town water of high resistivity. Washing was started with the bottom of the insulator, moving upwards: this could be done without flashover. MR CSUROS (GB) confirmed that washing had been carried out for many years on the grid. One of the additional disadvantages of grease was that an estimate of the degree of pollution could not be obtained by the simple means of monitoring leakage current.

An account of a salt storm in Ireland was given by MR S. TINNEY (Eire), in which it was noticed that the transformer bushings were not affected by deposits. This was attributed to hot air arising from the transformer on load, and he suggested the use of heating elements on other insulators which could be switched on at the onset of a salt storm. From MR PERSSIN (Sweden) came an unusual account of the peculiar evacuation habits of the buzzard and a statistical record of the flashovers attributed to this cause.

The study committee has been concerned with the factory testing of insulators, and a review was given of the practices of different countries in temperature-cycle or thermal shock tests for large insulators. Attention was also given to the use of non-destructive testing with supersonics but the results still appear to be inconclusive.

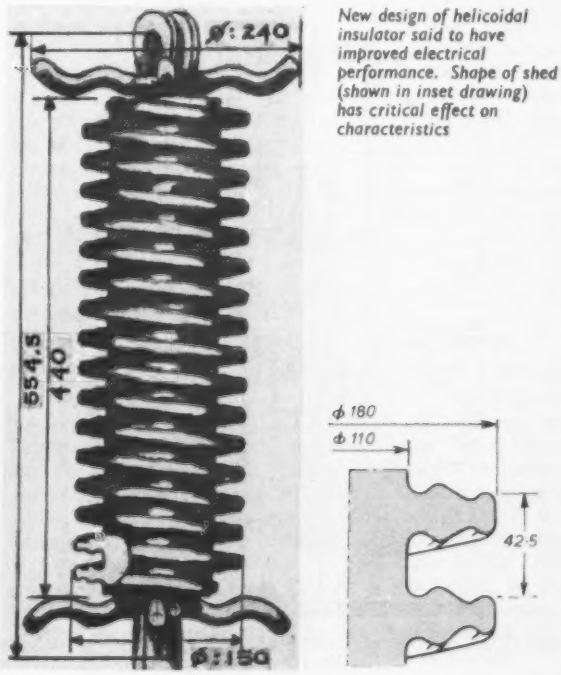
### Helicoidal Insulator

A distinctive new design of insulator with sheds arranged as a helicoidal ramp was described in a paper, but attracted little comment from delegates.

The early development work relating to 15 kV design was described and led to the evolution of the type shown below. The cemented hardware end rings eventually chosen led to reduced overall length for a given voltage and brought the concentrated field region within the porcelain so as to minimise brush discharges. It enabled the sparking distance in the leakage path to be appreciably elongated, but it gave rise to a somewhat greater core diameter. However, the use of helicoidal sheds enabled the turns to be placed closer to one another so that an adequate leakage path could be obtained with shallow sheds. In this way, the overall diameter of the insulator was hardly greater than that of the normal long-core type having equivalent behaviour. Formation of the shed eventually chosen was similar to that shown in the drawing. This gave excellent behaviour in rain conditions, the water flowing along the spiral, ensuring perfect potential distribution. The accompanying table, taken from the paper, shows results of one of the tests on this type of insulator compared with other forms of insulator.

| | 13 cap and pin units. | 2 long-core units. | 3 helicoidal units. |
|---|---|---|---|
| String length mm ... | 1,843 | 1,902 | 1,862 |
| Arcing length mm. ... | 1,736 | 1,430 | 1,488 |
| 50 c/s withstand volts under rain ... ... | 440 | 400 | 448 |
| Impulse withstand V | | | |
| Positive wave (kV crest) ... ... | 910 | 840 | 948 |
| Negative wave (kV crest) ... ... | 950 | 938 | 990 |

In the discussion, one of the authors, MR GION (France) confirmed that the insulators suffered little damage under power arcs. He considered that the nature of the profile was critical. Such insulators were now undergoing tests in the field and some units are to be tested in England.




*New design of helicoidal insulator said to have improved electrical performance. Shape of shed (shown in inset drawing) has critical effect on characteristics*

# Direct Current

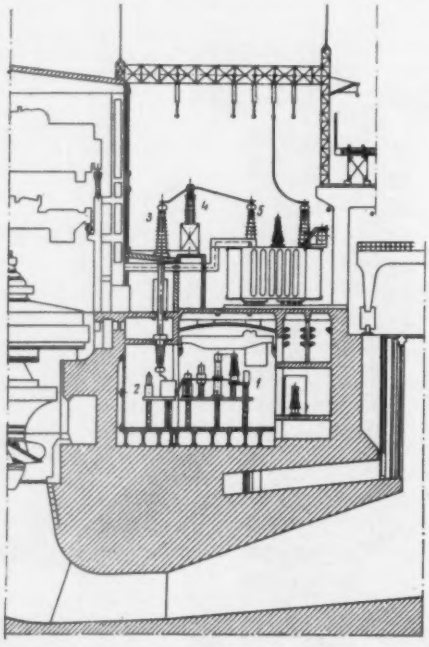
THE starting point of the discussion on direct current was brief accounts of existing transmission schemes. MR VON GEITER stated that the Gotland scheme had now been in service for five years and last year 92% service was obtained. Fifteen faults occurred and one of the major causes lay in the voltage dividers. Improvements had been made using glass fibre and epoxy resin and so far this year only one fault had occurred. Speaking of experience on the Kashira-Moscow line, MR KOSTENKO said that the main trouble experienced had been failure of the valves to switch in and also considerable radio disturbance, although this has been ameliorated by filters. Experience on this line has led to the decision to use two valves in series on the Stalingrad-Donbas line.

Experience on these two schemes had greatly influenced the design of the two schemes now proposed, the Channel cable and the 800 kV line in USSR. Of these the Russian scheme was the larger, involving the transmission of 750 MW over a distance of 750 km from Stalingrad to Donbas line, particulars of which are given below.

## Transmission at 800 kV

Comparison of capital cost between a 500 kV a.c. system and an 800 kV d.c. system revealed they were about equal. However, it was decided to adopt ±400 kV d.c. on the grounds that this line would eventually be used in larger transmission systems.

To provide the 800 kV, eight series-connected valve bridge circuits of 100 kV each will be used, with two series connected valves in each bridge arm, to reduce working duty on the valves and to improve reliability. The circuit was arranged for 12-phase operation. The valves will be insulated to earth in two stages separated at an intermediate potential platform. The platform voltage will be anchored by connecting it to the bridge pole having the lowest potential to earth. The exciters and pumps will be connected between earth and the platform and the insulating transformers between the platform and each valve. At the Stalingrad station the valves will be installed over the draught tubes of the hydro station and will be connected to the outdoor part of the station by special cable leads. The converter midpoints will be connected to working earths located at about 24 km from the stations, and removed from areas saturated with underground structures. They were designed as steel electrodes laid in coke-breeze-filled trenches.




*800 kV d.c. converter station situated over discharge tube of Stalingrad hydro electric station*

The overhead transmission line like that of the converter station itself was based on experience with the Kashira-Moscow system. Two 712 mm² a.c.s.r. bundle conductors will be provided for each pole spaced 400 mm with an earth wire arranged to give a 30° protection angle. To provide flexibility, automatic regulation was planned to be carried out by a booster transformer acting on the excitation of transmitter generators in Stalingrad hydro-electric station and by means of automatic grid control. Even automatic change of direction power flow will be provided for. Capacitors will be used to provide the reactive power required within the converter station. At the Donbas end, should an excess of reactive power arise either through reduced power transmission or reversal of current flow, the excess capacitance will be used on the 200 kV local network.

## Channel Link

Another paper presented in this group discussed some of the factors considered in planning the France-England cable link. It was considered that for single-core cables the present limit appears to be about 300 kV from the insulation point of view. While considering conversion plant experience suggested not more than two groups in series and an inverse voltage of 150 kV per valve, giving ±300 kV as the limit. A conductor section of 1 sq in. with 300 kV insulation lead to a cable of 4·62 in. diameter and a current rating of approximately 1,360 A, which seemed to be about the present limit. The use of the sea for return circuit could not well be used in the Channel, and for a long circuit the saving in cable more than covered the cost of higher insulation necessary with sea return.

For the France-England connection, each station will have two groups of valves supplied by transformers connected in star-star and star-delta, respectively, to give 12-pole operation. Each group of valves will comprise 6 valves in double bridge connection, a seventh by-pass valve being available to shunt any faulty group. The two valve groups will be connected in parallel on the a.c. side and in series on the d.c. side. Condensers were to be preferred for supplying the reactive power requirements of the converters and had the advantage that they could be adapted to form part of harmonic filters. On the other hand, they could be inflexible in face of load variation. Two filters were to be provided for dealing with harmonics, each connected to approximately half of the compensating condenser banks and tuned to accept the fifth-seventh harmonics and eleventh-thirteenth harmonics, respectively. With reversible transmission, cable polarity may have to be changed and the effect on the dielectric may be serious. Constant polarity can be maintained by d.c. reversing isolators at each end of the cable, automatically operated. However, the speed of operation was insufficient if full advantage was taken of the facility of high-speed emergency reversal and on such occasions reversal of polarity on the cables must be tolerated.

For the proposed 100 kV d.c. scheme, impulse withstand level of d.c. equipment was to be 425 kV and for the 90 kV a.c. equipment on the a.c. side, 525 kV. Arrestors will be provided on the d.c. side between each pole of the cable and earth and also across each valve group and between the d.c. reactor terminals and earth. On the

English side the station will be only 2·5 km inland on an exposed coast and therefore the creepage length of overhead line insulators to be adopted is 1·5 to 1·6 in. per kW, but no increased insulation will be provided in the case of the French station, which is 5 km inland. The valves will be housed indoors with continuous screening to prevent radio interference. Particular attention had been given to air-conditioning, since on full-load there will have to be dissipated some 75 kW by the ventilating air to the valves and 170 kW by convection and radiation from the valves, chokes and reactors.

In considering the choice of cable, a limiting factor was the depth of water in which the cable was to be laid and at the present time it did not seem possible to lay submarine cables with linear weights of the order of 25 kg/m at depths greater than 300 to 400 m. Some thought had been given to the use of polythene insulation, but as such cables at relatively limited dielectric stresses gave unexplained breakdowns arising possibly from local weaknesses during manufacture of long, continuous lengths, impregnated paper appeared at present to be the only reliable insulant. With a.c., considerable progress had been made by applying pressure to the insulant, thus permitting higher dielectrics stresses, while postponing the onset of ionisation; for d.c., however, pressurisation even to 10-15 atmospheres would not permit appreciably higher working stresses. In addition, the presence of gas passages within the cable could permit water penetration in the event of a fault. Single-core, solid type cables have been chosen because of their inherent simplicity. The two cables will be laid at the same time on the sea bed to ensure proximity.

There was considerable difference in the design of valves for the two systems. The valves for the Channel Link will have four anodes in parallel to give 800 A, while the Russian design will use single anode valves for about the same current, two valves being connected in series. Both, however, use 12-phase conversion.

Adding some particulars on the Channel Link, MR LAURENT (France) said that originally a.c. had been considered but d.c. was chosen as more economic and in order to provide wider experience. The margins in favour of d.c. have now been reduced but he was still confident in the choice.

## D.C. Test Station for Acton Lane

To encourage development in valves, the CEGB was planning to set up a testing station, of which brief particulars were given by MR A. STALEWSKI. This will be rated at 67 MW, 70 kV with single-anode 300 amp valves. They will be arranged for back-to-back working or as an asynchronous system link. This equipment will be sited at the old Acton Lane generating station, the obsolete generators being used as synchronous condensers.

## D.C. Insulators

A study of the special requirements of d.c. insulators was made in a paper by MR H. WITT (Sweden). He pointed out that since switching overvoltages were practically absent on d.c. and line energising can be carried out smoothly by grid-control on the rectifiers, it was the ability of the insulation to withstand normal service voltage that was the determining factor with d.c., even in clean areas. Therefore, the question was mainly one of leakage distance. Under polluted conditions, flashover voltage approximately equaled the r.m.s. value of a.c. flashover voltage and should therefore have the same leakage distance, about 5 to 7 cm/kV voltage to earth. Under clean conditions this value could be reduced to 2 cm/kV and most long transmission lines pass through clean areas. However, it might well be that insulators specially designed for d.c. might offer important possibilities.

In the discussion, Mr Witt added that atmospheric conditions will have little effect, they were not significant. On some questions it was possible to translate a.c. experience into terms of d.c. service; this was particularly important in pollution studies. The similarity of performance between insulation on d.c. and a.c. was confirmed by DR FORREST, but he felt the d.c. duty was more onerous. They worked on a basis of 4 to 5 cm/kV for leakage, 30% more than for a.c. He mentioned that they had had 100 kV insulators under test for three years at Leatherhead, Croydon and Brighton, giving clean, polluted and salt conditions. In Russia, various types of insulators were tested on the Kashira-Moscow line over eight years. It was the practice to clean them twice a year a Russian speaker added.

## Radio Interference

In preparation for the installation of the converter stations on the Channel Link, a special study of radio interference had been carried out in Sweden over the frequency range 0·15-150 MHz. This had given information on the anticipated signal-to-noise ratio at the planned station at Lydd. The report by MR MARTIN and MR PREWETT (GB) showed that even where broadcast and television signals are feeble, adequate precautions could be taken by screening and filtering if carried out in the planning stage. The cost was considerable and might add 40%-50% to the cost of a conventional building. It was expected that the cost of the 378,000 cu ft Lydd converter building will be about £90,000.

Confirmation for the views in this report came from MADAM VINAGRADO (Russia), but their studies of plant had shown that shielding of the building for the Stalingrad-Donbas stations will be superfluous. No difficulties had arisen from harmonics. MR MARTIN confirmed that interference is largely an economic problem, but one that is becoming more difficult with increasing use of vhf for communication and broadcasting.

The introduction of a d.c. link in a general a.c. network gave rise to difficulty when using an a.c. network analyser for system calculations. A mathematical resolution of the problem was given in a report by DR UHLMANN (Sweden) which enabled studies to be made involving normal operation, symmetrical a.c. faults and faults in d.c. transmission. This method was generally endorsed in the discussion, during which MR ADAMSON added some comments on the performance of semiconductors in control circuits. Out of 48 in use, they had not lost a single transistor in four to five years, though some had changed their internal impedance. Transistors should not be used as a medium of gain but only as a switch. Provided this was done, they are substantially independent of temperature.

## Power Conference in London

TWENTY delegates from Canada and the USA are in Britain attending the first biennial conference of the Hydro Electric Power Commission of Ontario, the Tennessee Valley Authority and the CEGB. The conference opened at Bankside House, London, on Monday, and continues until 29 June. Primary object of the meeting is to provide an opportunity for discussion of the managerial, technical, financial and administrative features of this type of publicly-owned supply undertaking. The group of six delegates from Canada is led by MR W. R. STRIKE, Q.C., vice-chairman of the HEP Commission, and the group from the USA by MR BROOKS HAYS, one of the directors of the Tennessee Valley Authority.

# equipment for industry

### Low price process timer

THE "Imp" process timer is said to provide a variety of switching arrangements, with facilities for resetting automatically and starting remotely, in a single unit priced at about £13. It is available in either flush or wall mounting patterns and has a black scale engraved on a matt white dial with two pointers for setting and timing. The timer is driven by a continuously running synchronous motor, the sequence required being selected by an electromagnetic clutch. When the pointer reaches zero it operates a snap action changeover contact and a further contact is operated after a short interval. The contacts are suitable for 2 A, 250 V a.c. The timer is housed in a robust case and incorporates two instantaneous and two delay changeover switches connected to a 15-pin fixed plug for external connection. The range of Imp timers extends from 30 seconds with ½ second settings to 24 hours with 20 minute settings. *Londex Ltd., Anerley Wks., 207 Anerley Rd, London S.E.20.*

### High-bay industrial lighting fittings

ADEQUATE illumination in modern factories and industrial plants, such as steelworks, requires a broad, intensive light distribution from high-bay fittings. Recently a range of heavy-duty industrial fittings suitable for 1 kW MB and MBF mercury and mercury/fluorescent lamps has been added to the Holophane series of prismatic fittings. They have a prismatic reflector, mounted on a steel ring and a cover supported from a cast-metal canopy, protecting the lampholder. By using an open neck, convection currents are encouraged, which remove dust from the reflector and restrict temperature rise. Three types of heavy-duty prismatic glass reflectors are available giving alternative light distribution characteristics from one fitting. The fittings are suitable for 400-1,000 W discharge lamps and 1-1·5 kW tungsten filament lamps. Their diameter is 15¾ in. and overall height is 19¼ in. maximum. A translucent version is also available. *Holophane Ltd., Elverton St, S.W.1.*

### Puncture-proof post insulator

SEVERAL advantages are claimed for an improved design of line insulator intended primarily for locations where lightning incidence is high, or in salt-laden atmospheres where deposits are liable to form on an insulator and cause flashover. Instead of the metal ferrule commonly used on pin insulators for taking the locating screw, the new design has a malleable cast-iron base drilled for a steel fixing stud, and in to which the porcelain bushing is cemented. This type of insulator is designed for service voltages of 6·6 to 11 kV, and has sheds shaped to give high flashover values with good resistance to mechanical damage. The dry flashover voltage is said to be 85 kV, falling to 55 kV on wet flashover. Shed spacing is claimed to preserve full cleaning action, and if required a semi-conducting glaze can be applied to prevent radio interference. Known as the BC46, this insulator is claimed to be virtually puncture-proof and to show service damage immediately by the white porcelain appearing through the dark brown glaze. *Doulton Industrial Porcelains, Wilnecote, Tamworth, Staffs.*

### New extinguishing fluids

MOST of the conventional fire extinguishing fluids used in connection with electrical fires have some disadvantage. $CO_2$ is stable, relatively non-toxic, but has low extinction efficiency and is a gas at normal temperatures; carbon tetrachloride is highly toxic and dangerous to use in confined areas; methyl bromide is even more toxic and chlorobromomethane, though less toxic, is highly corrosive to most metals.

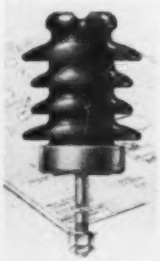
Two new chemicals, bromotrifluoromethane and dibromodifluoromethane, are now available under the trade names of Isceon 13B1 and 12B2 and these have good extinction efficiencies and are more stable than methyl bromide or chlorobromomethane. 13B1 is the least toxic —less than $CO_2$ in fact—but the higher boiling point of 12B2 may be of value in some cases. Neither has any corrosive effects on metals and both are eminently suitable for electrical purposes. *Consolidated Zinc Corporation (Sales) Ltd., 37 Dover St, London W.1.*

### Daylight light control

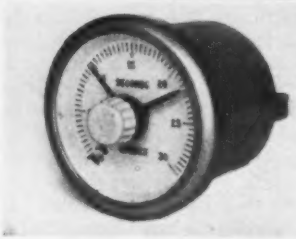
AUTOMATIC switching-off or on of lighting installations as daylight conditions alter can be accomplished with the "Mayklite" photo-cell unit housed with an overriding time switch and circuit switching relay in a steel box. Up to three sensing heads can be used with this light control switch for sensing low illumination levels in particular parts of a building. *Mayra Electronics Ltd., 551 Holloway Rd, London N.19.*

### Fibreglass insulation

POLYESTER bonded fibreglass is in increasing demand for insulation where lightness, high tensile strength and good electrical properties are required. One possible drawback to some grade is a tendency to ignite and burn at high temperatures since some of the polyester bonding resins and their plasticizers are combustible. Now a new, lost-cost, flame-retardant grade fibreglass mat laminate is available in sheet form which is suitable for fabricating into bus-bar supports, arc barriers, operating levers, slot wedges, covers for electrical equipment, etc., in fact everywhere in the electrical fields where tensile strength, impact resistance and electrical insulation is needed. The standard size of sheet is 34 in. by 34 in. and it is available in a range of thicknesses. *Permali Ltd., Bristol Rd, Gloucester.*



*Doulton BC46 6·6 and 11 kV puncture proof post insulator*



*The Londex "Imp" process timer rated at 2 A, 250 V is available in several time ranges*

*Heavy duty high bay industrial reflector fittings for 400-1,000 W mercury discharge lamps or up to 1,500 W tungsten lamps by Holophane Ltd*

# for the electrical trade

### Undersink hot-water systems

THE makers of "Lidomat," the electric automatic water heater which won the first award for domestic equipment at the last ASEE exhibition, have announced details of eight alternative hot-water systems that can be adopted with their unit.

"Lidomatic" systems cover kitchen sink and wash basin installations for a wide range of circumstances requiring swivel spouts, pillar cocks of all types, wall plate stop cocks, outlet bibs, etc. All these accessories are available from the manufacturers. The "Lidomat," a 3,000 W appliance, is priced £12 13s 11d tax paid. *Heatrae Ltd., Norwich, Norfolk.*

### Coffee-bar milk urn

GEC's new commercial milk warming urn will heat and maintain one gallon of milk at a required temperature not exceeding 180°F. Milk is put in a "Pyrex" container heated by water within the outer case. The water is heated by a 1 kW sheathed-wire element controlled by a 10 A switch. It has thermostatic control and automatic emergency cut-out. Price of the urn, Model H094, is priced £48 10s.

### Automatic ironing

A DEVICE for "ironing" flat articles of washing is illustrated below. "Tray ironing" as the makers describe it, is claimed to efficiently complete the laundering of large textile items and simple garments. Washing is folded damp, placed on the tray and shifted periodically until dry. A 300 W element provides heat to a detachable tray, temperature being controlled by shifting the tray slightly in the base. This movement widens or narrows ventilation holes in the side of the unit allowing a certain degree of temperature control, though as a safety device the holes cannot be completely closed. Obviously "Aironer" as it is called, may be utilised for other purposes, notably as a plate warmer or for the heating of very small spaces. It is stove enamelled, supplied in various colours and hangs up by a handle when not in use. The appliance, guaranteed for six months, will cost over £10 retail, this minimum representing the list price, not including tax. *Burflex (Aldershot), 7 Canal St, Brierley Hill, Staffs.*

### "Astral" dryer price cut

MORPHY-RICHARDS have announced a reduction in the price of the "Astral" spin dryer which comes into effect immediately upon the current SBU/1 model. Retail price is now £23 2s.

### Rose and cord-switch set

CORD-OPERATED switches designed to match a ceiling rose are produced under the trade name "Cordcone." The switch is a 13 amp model, conical in shape, which will control 80 W fluorescent tubes up to 30 in number. It can be operated with its cord at any angle not exceeding 90°. In industrial applications, where it may be required for remote operation of a motor, it can be supplied with a pilot light in the base to indicate a live load. The ceiling rose, "Flexcone" has a closed back requiring no pattress, the base being attached to the ceiling and the cover screwed on, hiding the base entirely. Single-pole one-way ivory switches are priced £3 2s per dozen, list. Double-pole models are also available. The rose is priced from 13s to 19s a dozen. *Falk, Stadelmann and Co., Farringdon Rd, London E.C.1.*

### Starlight

A LARGER range of Piselli jewel light decorations is available to grace this year's Christmas trees. The tiny bulbs are set in the hearts of strings of miniature roses, in the flames of fairy candles, in the ruddy berries of holly clusters or simply as starlike points of light in tinsel garlands. "Chrystal" star lanterns with 2 in. long "rays" and the jewel lights at the centres are among the more spectacular features of the range. Prices vary from 16s for a string of ten bulbs to 58s, including purchase tax. All prices include plugs. *Insley (London), 21 Poland St, W.1.*

### Cable bands

METWAY have produced a range of four plastics cable bands for bunching up cables and flexibles. Ribs across the width of the band grips the flexes tightly, the whole thing being secured by a double-slot integral buckle. Prices, according to size, are from 14s 4d to 19s 5d per hundred.

### Convertible batten

A BATTEN-TYPE fluorescent lighting fitting, the "Uti-Lite," has been specially designed for simple conversion into a reflector. To do this the bi-pin lampholders are passed through the bridges in the top of the channel, which is then inverted and a reflector attached with two screws. In either form the fitting allows suspension by chains direct to ceiling, direct to BS conduit box or conduit tubes.

The lampholders have smoothly designed covers moulded in white plastic. Revo polyester control gear is housed in the detachable gear tray in the white channel. "Uti-Lite" is priced £3 17s 6d, 80 W, and £3 5s, 40 W. *Revo Electric Co., Groveland Rd, Tipton, Staffs.*

## TRADE PUBLICATIONS

BULGIN.—Leaflet on moulded rocker-contact switches. A. F. Bulgin and Co., Bye Pass Rd, Barking, Essex.

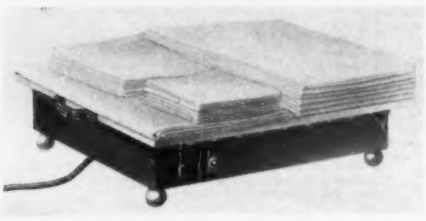
KENT. — Publication 281; eight-page pamphlet on orifice fittings. Publication 109; leaflet on JSM domestic water meter. George Kent Ltd., Luton, Beds.

ELECTROHEAT. — 18-page handbook of stress relieving and electrical pre-heat applications. Price 3s. Cooper Electroheat Ltd., 164 Lord St, Southport, Lancs.

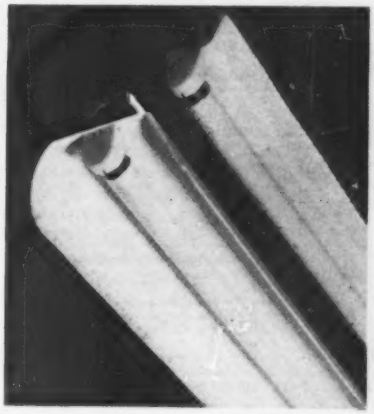
TI.—15-page brochure on the work of Tube Investments Ltd., Adelphi, W.C.2.

STURTEVANT.—Publication 7020, pamphlet on Electrostatic Precipitation. Sturtevant Engineering Co., Southern Hse, Cannon St, E.C.4.

*"Cordcone" and "Flexcone" switch and ceiling rose by Falks*



*"Aironer" the ironing tray by "Burflex"*



*Revo's "Uti-Lite" convertible fitting. 80 W £3 17s*

# News of the Week

## ONLY 5,000 MW NUCLEAR PLANT BY 1968

### TRIMMING OF 1957 PROGRAMME OUTLINED IN NEW WHITE PAPER

A STEADILY rising rate of nuclear commissioning should give the country about 5,000 MW of plant by 1968—that is the latest target figure given in a White Paper published this week. This is the fourth nuclear programme and represents a slowing down on the target given in 1957 when the aim was to reach 5,000 to 6,000 MW by 1966.

From published statements it has been known for some time that the nuclear programme is being slowed down. Several pressures have been at work to this end. The building up of coal stocks has withdrawn the threat of fuel deficiency from the country while conventional coal-fired power stations have shown a greater improvement in efficiency than had been foreseen.

None the less, as the White Paper points out, by 1975 power stations will be consuming some 125 million tons of coal a year, over double the present rate, thus it is felt prudent to provide for increase in supplies of nuclear power.

**In about 10 years' time, it is stated, it should be cheaper to generate base load in nuclear stations than in conventional stations. It is anticipated that roughly one nuclear station will be ordered every year and that the capacity of individual stations will give the plant programme required.**

The effect of this curtailment on the 1957 nuclear plant programme is estimated to reduce by some £90 million the cost of power stations commissioned over the next seven years. It is pointed out, however, that there will be some loss running into millions of pounds to the UK Atomic Energy Authority on account of the uranium stocks.

The rate of ordering provided in the programme means that at any time there will be five or six stations in various stages of development from design to commissioning.

The advance gas-cooled reactor at Windscale is now nearing completion and although it is not known when sufficient information will be available for the design of a commercial station it was suggested at the Press conference that this might be within the next two years.

In the House of Commons, MPs questioned the Minister of Power on the content of the White Paper, and stressed the importance of retaining the design teams brought into being under the nuclear power programme, since the capital cost of nuclear power stations was related to technical improvement. The Minister agreed that it was important to continue to get experience in building nuclear stations "so that we shall be ready to build them on an increased scale when the break-even point is reached."

Earlier the Minister described the programme outlined in the White Paper as not so much a cut-back, but "a deferment of the acceleration which was planned in 1957." This caused laughter in the House.

**The four Government nuclear programmes**

| Programme date | Completion date | Capacity |
|---|---|---|
| 1955 | 1965 | 1,500-2,000 |
| 1957 (March) | 1965 | 5,000-6,000 |
| 1957 (Oct.) | 1966 | 5,000-6,000 |
| 1960 | 1968 | 5,000 |

**The Current Nuclear Power Station Programme**

| Nuclear Station | Capacity MW | Date Full Load |
|---|---|---|
| **Nuclear stations under construction** | | |
| Berkeley (Glos.) ... | 275 | 1961-2 |
| Bradwell (Essex) ... | 300 | 1961-2 |
| Hinkley Point (Somerset) | 500 | 1961-2 |
| Trawsfynydd (Merioneth) | 500 | 1963-4 |
| Hunterston (Ayrshire)... | 300 | 1963-4 |
| **Tenders are being considered for:** | | |
| Dungeness (Kent)* ... | 500 | 1964-5 |
| Sizewell (Suffolk) ... | 550 | 1965-6 |
| **Application for site being considered at Oldbury (Glos.).** (Public inquiry held April.) | | |

* *The order for Dungeness nuclear power station will be placed within the next few weeks.*

## Elstree-Finchley Line Inquiry

PROPOSALS of the CEGB for the erection of a 275 kV transmission line from Elstree to Finchley and an associated substation at Mill Hill, are to be the subject of a public inquiry to be held at Hendon Town Hall on 19 July. In addition to Hertfordshire and Middlesex County Councils, a substantial number of local authorities are expected to oppose the proposals, which have been the subject of strong local objection.

We reported on 30 April, 1959, that the CEGB had applied to the Minister of Power for consent to erect the line from the existing substation near Elstree to a new substation at Burtonhole La, Mill Hill.

It was then stated that the 7½ mile line was urgently needed to meet the increasing demands in the southern section of EEB and in north west London area, but as no way of overcoming the objections could be found at a reasonable cost, a public inquiry was expected.

## MOTOROLA IN U.K.

THE American electronics manufacturer, Motorola, is seeking a British company to distribute its semiconductor products in the UK. The range includes power transistors, silicon rectifiers, Zener diodes and Mesa transistors. An executive of the firm, Mr. N. T. Fotiadi, is in London to meet with prospective distributors.

## Washing machines down in Area Board sales

AT first glance the decline in the sales of washing machines by area electricity boards during April would seem apparent enough when compared with the same month last year, the decrease being over 28%. But April, 1959, witnessed a surge of consumer spending following purchase tax reductions in the Budget and most appliances enjoyed increased sales. Compared with the previous month, washing machine sales dropped 1,048 from 12,116, but this in turn was up on the February figure of 11,969.

Although refrigerators sold in April are fractionally down on April, 1959, again because of last year's Budget reductions in purchase tax, the monthly figure has increased steadily since the beginning of 1960, as follows: January, 4,341; February, 5,335; March, 9,910; April, 15,567.

Cookers slightly down on last year, show a decrease of 17% on the March figure. Wash boilers continue to fall. Storage water heaters, over 20% up on April last year, are actually 14% down on the March total, while immersion heaters made a small gain over the month.

| Appliance Sales by Area Boards | Sales in month ended 30 April, 1960 | | Sales in 12 months ended 30 April, 1960 | |
|---|---|---|---|---|
| | Total | % change over April, 1959 | Total | % change over previous 12 months |
| Cookers ... | 27,015 | − 2·8 | 345,149 | +16·8 |
| Water Heaters: | | | | |
| Immersion | 16,743 | − 5·6 | 193,546 | +13·8 |
| Storage ... | 6,197 | +20·3 | 65,669 | +22·6 |
| Washboilers | 4,436 | −24·2 | 63,963 | − 17·2 |
| Washing Machines... | 11,068 | −28·8 | 157,511 | +15·7 |
| Refrigerators | 15,657 | − 0·6 | 172,449 | +84·5 |

*When assessing these figures it should be borne in mind that sales by area boards represent only a part of the total sales throughout the country.*

## ELECTRICAL FAIR POSTPONED

*THE first Electrical Fair has been postponed. Originally scheduled to be held from 23 Sept. to 1 Oct. next at Alexandra Palace, the exhibition has been deferred by the organisers, Electrical Fairs Ltd., because the majority of exhibitors prefer a venue in Central London. Revised arrangements are to be announced by the organisers in the near future.*

*It now seems unlikely that the Fair will be held before the autumn of 1961, or even 1962, so great is the demand for London's principal exhibition halls. The organisers believe that a central venue will attract more exhibitors and secure a larger attendance.*

*The fair was intended as a "shop window" for domestic electrical appliances of all kinds, timed to stimulate public interest at the beginning of the autumn selling season. The company, Electrical Fairs Ltd., was formed specifically to organise the exhibition, with Mr P. A. Thorogood, as secretary.*

# H.P. Curb hits Hoover

### *REDUNDANCY : STRIKES : COMPROMISE*

SOME 800 Hoover employees, nearly 10% of a total payroll of 8,610, were to be dismissed as redundant due to "falling demand on the home market caused by the recent imposition of hire purchase credit restrictions," Hoover announced last week. The announcement was followed by a protest strike of 2,000 employees at the company's Perivale factory in London and a further token strike involving some 500 workers at their High Wycombe plant.

At Cambuslang, Hoover have agreed to postpone the redundancies and introduce a shorter working week for a limited period during which they hope the demand for the firm's products in the home market will improve. A similar "reprieve" has been agreed in South Wales and will be offered in London when the men return to work, we understand.

The Scottish formula — short-time working with no overtime—was put forward by the men and accepted by the management last Friday. We understand that the redundancies will be postponed for four or five weeks, but if the position has not improved by then they will take effect.

The dismissals, if they take effect, will be spread over the company's factories at Merthyr Tydfil, Glamorgan, where about 420 must go, Cambuslang, Lanark (300), and Perivale, Middlesex (120). The staff concerned will receive redundancy pay based on length of service.

**Hoover say they "particularly regret" having to make this move since much of the redundancy is in areas where there is already unemployment. "The situation has been brought about by the restrictions imposed to cut down demand. The company's export business is substantially up on last year, but if conditions in the home market harden still further then this will mean higher production costs and will affect the company's competitive position in markets abroad."**

The strike at Perivale—the first at this factory—was described by shop stewards as "an unofficial demonstration." The management were told that the men would only return to work if those under the threat of dismissal were kept on the payroll until suitable alternative employment was found elsewhere.

A Hoover spokesman said: "The credit squeeze has hit us badly enough for us to have to reduce staff in this way. Although the workers might say the company made a record profit last year, the workers themselves had a record year, too, with their average income up to £18 and £19 a week."

Early in March Hoover announced a record profit of over £11 million for the previous trading year, almost double that of the year before.

We understand that, despite the present redundancy, Hoover intend to go ahead with their development plans at their factories in Wales, Scotland and London.

## Appliances in the Doldrums?

EVEN before the new hire purchase restrictions were introduced at the end of April there was an appreciable decline in sales of washing machines and vacuum cleaners. According to BEAMA figures deliveries of washing machines (including those combined with spin dryers) by British manufacturers fell from 269,000 in the last quarter of 1959 to 227,000 in the first quarter of 1960—a 15% drop. Vacuum cleaner deliveries decreased by 13%, from 359,000 to 312,000.

Another adverse factor is the increasing competition of foreign imported appliances. Mr S. Roberts, Hoover's managing director, told shareholders in his recent annual report that imported washing machines and vacuum cleaners were absorbing 10% and 8% of the home market, respectively.

The Hoover dismissals are the first major redundancy in the industry to be attributed directly to the effect of the h.p. curb. Other companies have experienced a falling off in sales to a lesser extent. Spokesman of some of the bigger appliance manufacturers said:

**AEI-Hotpoint:** No redundancy, and despite the h.p. restrictions the demand for their new Supermatic washing machine and Iced Diamond refrigerator is still ahead of supply. Due to a fall in demand for some products, however, recruitment has been suspended at their Peterborough factory.

**English Electric:** Sales of washing machines and dryers have been showing a "marked decrease" since April, but refrigerators are "still active."

**GEC:** Business has slowed up in the appliance field, but "we do not see any immediate redundancy." The pipeline between the company and their distributors was fuller and trade stocks probably higher than they would like to see.

**Morphy-Richards:** No likelihood of redundancy dismissals. The demand for the M-R group's products "remains buoyant."

## *TORONTO SHOW*

A SELECTION of British consumer goods, including a lighting fitting, a radio set and kitchen equipment, is to be displayed at the Canadian National Exhibition in Toronto from 24 Aug. to 10 Sept. Some 200 exhibits, selected by the Council of Industrial Design, will be shown on a stand covering 2,000 sq ft, sponsored by the Board of Trade.

## TOO MANY REFRIGERATORS?

A HINT that a possible period of over-production may lie ahead for the refrigerator industry is given by Mr C. F. Richards, joint managing director of Morphy-Richards Ltd., in a letter published in the *Financial Times* last week.

The boom in refrigerator sales came at a time when the British refrigeration industry was ill prepared for it, he suggests. Production capacity was "hopelessly inadequate" and neither the demands of wholesale or retail stockists could be met.

As a result, many foreign makes of refrigerators were imported by wholesale distributors, but "there is a great deal of evidence to show that many who showed such undue haste to share in the boom created by the sudden sales break-through are feeling a little sorry for themselves."

"The picture is changing rapidly to the extent that in some quarters a possible period of over-production is whispered," Mr Richards adds. "As a result, one would expect to see a substantial decline in imports starting certainly not later than mid-1960."

### *No Price War?*

ANNOUNCING the reduction of the retail price of the Morphy-Richards "Astral" spin dryer from £27 13s 7d to 22 gns, Mr C. F. Richards commented: "This price reduction should not be interpreted as a sign that we are engaging in a price war. The Morphy-Richards group has not been affected by the re-imposition of credit restrictions. There is no evidence that these restrictions have in any way affected sales of our spin dryer which is largely a seasonal line and which was 'out of season' when the Chancellor curbed credit."

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### TRIMMING OF 1957 PROGRAMME OUTLINED IN NEW WHITE PAPER

A STEADILY rising rate of nuclear commissioning should give the country about 5,000 MW of plant by 1968—that is the latest target figure given in a White Paper published this week. This is the fourth nuclear programme and represents a slowing down on the target given in 1957 when the aim was to reach 5,000 to 6,000 MW by 1966.

From published statements it has been known for some time that the nuclear programme is being slowed down. Several pressures have been at work to this end. The building up of coal stocks has withdrawn the threat of fuel deficiency from the country while conventional coal-fired power stations have shown a greater improvement in efficiency than had been foreseen.

None the less, as the White Paper points out, by 1975 power stations will be consuming some 125 million tons of coal a year, over double the present rate, thus it is felt prudent to provide for increase in supplies of nuclear power.

**In about 10 years' time, it is stated, it should be cheaper to generate base load in nuclear stations than in conventional stations. It is anticipated that roughly one nuclear station will be ordered every year and that the capacity of individual stations will give the plant programme required.**

The effect of this curtailment on the 1957 nuclear plant programme is estimated to reduce by some £90 million the cost of power stations commissioned over the next seven years. It is pointed out, however, that there will be some loss running into millions of pounds to the UK Atomic Energy Authority on account of the uranium stocks.

The rate of ordering provided in the programme means that at any time there will be five or six stations in various stages of development from design to commissioning.

The advance gas-cooled reactor at Windscale is now nearing completion and although it is not known when sufficient information will be available for the design of a commercial station it was suggested at the Press conference that this might be within the next two years.

**The four Government nuclear programmes**

| Programme date | Completion date | Capacity |
|---|---|---|
| 1955 | 1965 | 1,500-2,000 |
| 1957 (March) | 1965 | 5,000-6,000 |
| 1957 (Oct.) | 1966 | 5,000-6,000 |
| 1960 | 1968 | 5,000 |

In the House of Commons, MPs questioned the Minister of Power on the content of the White Paper, and stressed the importance of retaining the design teams brought into being under the nuclear power programme, since the capital cost of nuclear power stations was related to technical improvement. The Minister agreed that it was important to continue to get experience in building nuclear stations "so that we shall be ready to build them on an increased scale when the break-even point is reached."

Earlier the Minister described the programme outlined in the White Paper as not so much a cut-back, but "a deferment of the acceleration which was planned in 1957." This caused laughter in the House.

**The Current Nuclear Power Station Programme**

| Nuclear Station | Capacity MW | Date Full Load |
|---|---|---|
| **Nuclear stations under construction** | | |
| Berkeley (Glos.) ... | 275 | 1961-2 |
| Bradwell (Essex) ... | 300 | 1961-2 |
| Hinkley Point (Somerset) | 500 | 1961-2 |
| Trawsfynydd (Merioneth) | 500 | 1963-4 |
| Hunterston (Ayrshire)... | 300 | 1963-4 |
| **Tenders are being considered for:** | | |
| Dungeness (Kent)* ... | 500 | 1964-5 |
| Sizewell (Suffolk) ... | 550 | 1965-6 |
| **Application for site being considered at Oldbury (Glos.).** (Public inquiry held April.) | | |

** The order for Dungeness nuclear power station will be placed within the next few weeks.*

## Elstree-Finchley Line Inquiry

PROPOSALS of the CEGB for the erection of a 275 kV transmission line from Elstree to Finchley and an associated substation at Mill Hill, are to be the subject of a public inquiry to be held at Hendon Town Hall on 19 July. In addition to Hertfordshire and Middlesex County Councils, a substantial number of local authorities are expected to oppose the proposals, which have been the subject of strong local objection.

We reported on 30 April, 1959, that the CEGB had applied to the Minister of Power for consent to erect the line from the existing substation near Elstree to a new substation at Burtonhole La, Mill Hill.

It was then stated that the 7½ mile line was urgently needed to meet the increasing demands in the southern section of EEB and in north west London area, but as no way of overcoming the objections could be found at a reasonable cost, a public inquiry was expected.

## MOTOROLA IN U.K.

THE American electronics manufacturer, Motorola, is seeking a British company to distribute its semiconductor products in the UK. The range includes power transistors, silicon rectifiers, Zener diodes and Mesa transistors. An executive of the firm, Mr. N. T. Fotiadi, is in London to meet with prospective distributors.

## Washing machines down in Area Board sales

AT first glance the decline in the sales of washing machines by area electricity boards during April would seem apparent enough when compared with the same month last year, the decrease being over 28%. But April, 1959, witnessed a surge of consumer spending following purchase tax reductions in the Budget and most appliances enjoyed increased sales. Compared with the previous month, washing machine sales dropped 1,048 from 12,116, but this in turn was up on the February figure of 11,969.

Although refrigerators sold in April are fractionally down on April, 1959, again because of last year's Budget reductions in purchase tax, the monthly figure has increased steadily since the beginning of 1960, as follows: January, 4,341; February, 5,335; March, 9,910; April, 15,567.

Cookers slightly down on last year, show a decrease of 17% on the March figure. Wash boilers continue to fall. Storage water heaters, over 20% up on April last year, are actually 14% down on the March total, while immersion heaters made a small gain over the month.

| Appliance Sales by Area Boards | Sales in month ended 30 April, 1960 | | Sales in 12 months ended 30 April, 1960 | |
|---|---|---|---|---|
| | Total | % change over April, 1959 | Total | % change over previous 12 months |
| Cookers ... | 27,015 | − 2·8 | 345,149 | +16·8 |
| Water Heaters: | | | | |
| Immersion | 16,743 | − 5·6 | 193,546 | +13·8 |
| Storage ... | 6,197 | +20·3 | 65,669 | +22·6 |
| Washboilers | 4,436 | −24·2 | 63,963 | − 17·2 |
| Washing Machines... | 11,068 | −28·8 | 157,511 | +15·7 |
| Refrigerators | 15,657 | − 0·6 | 172,449 | +84·5 |

*When assessing these figures it should be borne in mind that sales by area boards represent only a part of the total sales throughout the country.*

## ELECTRICAL FAIR POSTPONED

*THE first Electrical Fair has been postponed. Originally scheduled to be held from 23 Sept. to 1 Oct. next at Alexandra Palace, the exhibition has been deferred by the organisers, Electrical Fairs Ltd., because the majority of exhibitors prefer a venue in Central London. Revised arrangements are to be announced by the organisers in the near future.*

*It now seems unlikely that the Fair will be held before the autumn of 1961, or even 1962, so great is the demand for London's principal exhibition halls. The organisers believe that a central venue will attract more exhibitors and secure a larger attendance.*

*The fair was intended as a "shop window" for domestic electrical appliances of all kinds, timed to stimulate public interest at the beginning of the autumn selling season. The company, Electrical Fairs Ltd., was formed specifically to organise the exhibition, with Mr P. A. Thorogood, as secretary.*

# H.P. Curb hits Hoover

### *REDUNDANCY : STRIKES : COMPROMISE*

SOME 800 Hoover employees, nearly 10% of a total payroll of 8,610, were to be dismissed as redundant due to "falling demand on the home market caused by the recent imposition of hire purchase credit restrictions," Hoover announced last week. The announcement was followed by a protest strike of 2,000 employees at the company's Perivale factory in London and a further token strike involving some 500 workers at their High Wycombe plant.

At Cambuslang, Hoover have agreed to postpone the redundancies and introduce a shorter working week for a limited period during which they hope the demand for the firm's products in the home market will improve. A similar "reprieve" has been agreed in South Wales and will be offered in London when the men return to work, we understand.

The Scottish formula — short-time working with no overtime—was put forward by the men and accepted by the management last Friday. We understand that the redundancies will be postponed for four or five weeks, but if the position has not improved by then they will take effect.

The dismissals, if they take effect, will be spread over the company's factories at Merthyr Tydfil, Glamorgan, where about 420 must go, Cambuslang, Lanark (300), and Perivale, Middlesex (120). The staff concerned will receive redundancy pay based on length of service.

**Hoover say they "particularly regret" having to make this move since much of the redundancy is in areas where there is already unemployment. "The situation has been brought about by the restrictions imposed to cut down demand. The company's export business is substantially up on last year, but if conditions in the home market harden still further then this will mean higher production costs and will affect the company's competitive position in markets abroad."**

The strike at Perivale—the first at this factory—was described by shop stewards as "an unofficial demonstration." The management were told that the men would only return to work if those under the threat of dismissal were kept on the payroll until suitable alternative employment was found elsewhere.

A Hoover spokesman said: "The credit squeeze has hit us badly enough for us to have to reduce staff in this way. Although the workers might say the company made a record profit last year, the workers themselves had a record year, too, with their average income up to £18 and £19 a week."

Early in March Hoover announced a record profit of over £11 million for the previous trading year, almost double that of the year before.

We understand that, despite the present redundancy, Hoover intend to go ahead with their development plans at their factories in Wales, Scotland and London.

# Appliances in the Doldrums?

EVEN before the new hire purchase restrictions were introduced at the end of April there was an appreciable decline in sales of washing machines and vacuum cleaners. According to BEAMA figures deliveries of washing machines (including those combined with spin dryers) by British manufacturers fell from 269,000 in the last quarter of 1959 to 227,000 in the first quarter of 1960—a 15% drop. Vacuum cleaner deliveries decreased by 13%, from 359,000 to 312,000.

Another adverse factor is the increasing competition of foreign imported appliances. Mr S. Roberts, Hoover's managing director, told shareholders in his recent annual report that imported washing machines and vacuum cleaners were absorbing 10% and 8% of the home market, respectively.

The Hoover dismissals are the first major redundancy in the industry to be attributed directly to the effect of the h.p. curb. Other companies have experienced a falling off in sales to a lesser extent. Spokesman of some of the bigger appliance manufacturers said:

**AEI-Hotpoint:** No redundancy, and despite the h.p. restrictions the demand for their new Supermatic washing machine and Iced Diamond refrigerator is still ahead of supply. Due to a fall in demand for some products, however, recruitment has been suspended at their Peterborough factory.

**English Electric:** Sales of washing machines and dryers have been showing a "marked decrease" since April, but refrigerators are "still active."

**GEC:** Business has slowed up in the appliance field, but "we do not see any immediate redundancy." The pipeline between the company and their distributors was fuller and trade stocks probably higher than they would like to see.

**Morphy-Richards:** No likelihood of redundancy dismissals. The demand for the M-R group's products "remains buoyant."

## *TORONTO SHOW*

A SELECTION of British consumer goods, including a lighting fitting, a radio set and kitchen equipment, is to be displayed at the Canadian National Exhibition in Toronto from 24 Aug. to 10 Sept. Some 200 exhibits, selected by the Council of Industrial Design, will be shown on a stand covering 2,000 sq ft, sponsored by the Board of Trade.

# TOO MANY REFRIGERATORS?

A HINT that a possible period of over-production may lie ahead for the refrigerator industry is given by Mr C. F. Richards, joint managing director of Morphy-Richards Ltd., in a letter published in the *Financial Times* last week.

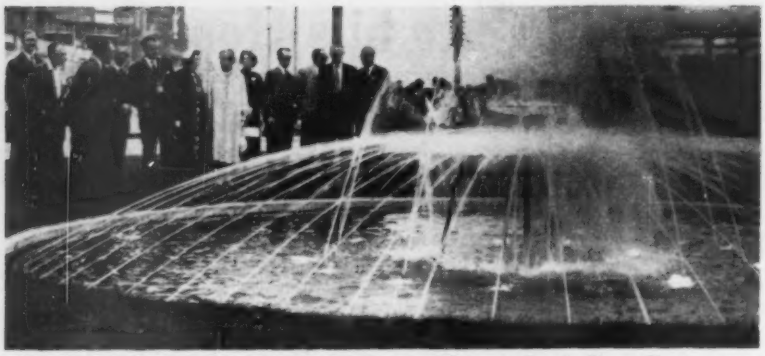
The boom in refrigerator sales came at a time when the British refrigeration industry was ill prepared for it, he suggests. Production capacity was "hopelessly inadequate" and neither the demands of wholesale or retail stockists could be met.

As a result, many foreign makes of refrigerators were imported by wholesale distributors, but "there is a great deal of evidence to show that many who showed such undue haste to share in the boom created by the sudden sales break-through are feeling a little sorry for themselves."

"The picture is changing rapidly to the extent that in some quarters a possible period of over-production is whispered," Mr Richards adds. "As a result, one would expect to see a substantial decline in imports starting certainly not later than mid-1960."

### *No Price War?*

ANNOUNCING the reduction of the retail price of the Morphy-Richards "Astral" spin dryer from £27 13s 7d to 22 gns, Mr C. F. Richards commented: "This price reduction should not be interpreted as a sign that we are engaging in a price war. The Morphy-Richards group has not been affected by the re-imposition of credit restrictions. There is no evidence that these restrictions have in any way affected sales of our spin dryer which is largely a seasonal line and which was 'out of season' when the Chancellor curbed credit."



*This illuminated fountain on the new traffic roundabout at Breeds Place, Hastings, was switched on last week by the Mayor (Ald C. Barfoot). Costing £1,000, with inward facing jets that cannot spray passing cars or pedestrians, the fountain is illuminated at night by 30 coloured lights in varying combination, and is already proving a great attraction to visitors* [Photo by courtesy of the "Hastings and St. Leonards Observer"]

# London Factory for L.C.E.

THE new Anglo-American company, LCE Ltd., to which we referred last week, is to have a factory in north west London. LCE, owned jointly by Joseph Lucas (Industries) through its subsidiary, G. and E. Bradley Ltd., and the Collins Radio Co. of USA, will manufacture electronic and communications equipment for aircraft. Production is expected to begin by September with an initial labour force of 250, increasing to 1,000 in two or three years.

Mr K. Jones, a director and general manager of LCE, said that the new firm was autonomous and not tied solely to manufacturing Collins equipment. It had freedom to develop and manufacture its own equipment or to take licences to manufacture any other equipment. In some cases they would be in competition with Collins in world markets and production of certain lines in America might cease if they could be produced more cheaply in Britain. LCE is understood to stand for Lucas Collins Electronics.

## Hayling Island Chairlift approved

WORK is expected to start in August on the electric chairlift to link Portsmouth with Hayling Island (referred to last week). The project has received approval from Portsmouth Corporation, and the Admiralty have made available Langstone Peninsula for use at one end of the lift.

Construction will take an estimated seven months. When complete, the chairlift will be able to carry 1,000 passengers every hour in four-seater bubble-cars 50 ft up along a 600 yd ropeway, two-thirds of which will be over water. At present the only form of transport between the island and the mainland is a ferry service in an open boat, or a 17-mile detour by road.

The scheme is expected to cost some £100,000 and should be ready in time for the next holiday season. Passenger charges are expected to be quite low.

## New Manweb Tariffs from 1 July

1 JULY next is the operative date for the new domestic tariff and the low off-peak rate of the Merseyside and North Wales Electricity Board, to which we referred on 26 May. The domestic tariff has a rate of 0·95d per unit for consumption over 212 units per room per quarter. Consumers taking the off-peak rate of 0·9d per unit will also pay rentals of 5s per quarter for the meter and 7s 6d per quarter for a time switch.

## *Apprentices Pay Negotiations*

NEGOTIATIONS on increased pay for apprentices in the engineering industry broke down last week. The union representatives rejected an offer by the employers which, in effect, would increase the pay of boys whose earnings were below a certain level. The unions are seeking an all-round wage increase, so the negotiations of the Engineering and Allied Employers' National Federation representatives have reported back to their management board.

## ZAGREB FAIR

AN international exhibition of measuring, control and automation techniques, and a display of reference and scientific books, are among special features at the Zagreb International Autumn Fair to be held from 10 to 25 Sept. next.

Last year's fair included 6,000 exhibitors from 30 countries, and was attended by more than 1,300,000 visitors.

# *More Power for Scilly*

PLANS to improve electricity supplies at St. Mary's, Isles of Scilly, were announced there last week when Mr A. N. Irens, chairman of the South Western Electricity Board, visited the island accompanied by Sir George Turner, part-time member of the board, and Mr H. R. C. White, West Cornwall district manager.

The board would install another generating set at St. Mary's this year, Mr Irens said. This was part of a scheme costing £13,250 to reinforce the local system. There were now 517 consumers at St. Mary's, including 326 homes, 41 farms, 143 commercial and four industrial premises.

Since the St. Mary's (Scilly) Electricity Supply Co. had been taken over three years ago, the board had invested nearly £30,000 in improving the power station and local distribution network. A new 450 kW generating set was installed on the island in 1958.

## OFFICIAL PUBLICATIONS

Nuclear Power Programme. HMSO. 4d (see page 1026).

BS G 176. Cartridge Fuses for Aircraft. Part 1, General requirements. 7s 6d; Part 2, Cartridge fuses and fuse links, 15s.

BS amendment slips: BS 91, Electrical cable soldering sockets, PD 3737; BS 215, Pt. 1, Aluminium conductors for overhead line power transmission purposes, PD 3751; Pt. 2, SCA conductors for overhead lines, PD 3752; BS 555, Tungsten filament lamps, PD 3716; BS 1326, Washboilers, PD 3738; BS 1645, Vacuum cleaners, PD 3736; BS 2655, Electric lifts, Pt. 1, PD 3722 and Pt. 2, Induction motors for driving lists, PD 3723; BS 2692, Fuses for above 660 V a.c., PD 3755; BS 2746, PVC insulation and sheath of cables, PD 3731.

Aids to Investment in the European Economic Community. Report by Assn. of British Chambers of Commerce. 2s 6d (see page 1030).

Mechanical Engineering Research. Report of National Engineering Laboratory Steering Committee. HMSO. 4s 6d.

## Berry's Publicity Move

A NEW department for the provision of sales literature, catalogues, showcards, printing blocks, etc., is to be set up by Berry's Electric Ltd. in their works at Second Way, Exhibition Grounds, Wembley Hill, Middlesex. Formerly distributed from the firm's Newman St. W.1, publicity department, the tonnage of literature despatched has now become so great that new arrangements have become necessary to avoid delays in despatch. The Print Section opens on 1 Aug., managed by Mrs E. M. Manning.

## New Seeboard Depot

NEW district h.q. buildings for the South Eastern Electricity Board were opened last week in Woodbridge Rd, Guildford, by the Deputy Mayor (Ald C. E. Nicklin). The premises, comprising offices, stores, garage workshop and open front garages, with other ancillary buildings, cost £86,000.

The new depot, built on a two-acre site made available by the CEGB adjacent to the generating station, replaces a number of obsolete buildings in and around the borough.

## Fractional Motor Conference

THE establishment of recognised standards for electric motors for domestic appliances intended both for the home and export markets, with particular reference to safety, is one of the aims of the Fractional Motor Conference whose annual report was published last week.

The Conference, which is an independent organisation serviced by BEAMA, was established in March last year to cater for this growing specialist industry whose annual turnover exceeds £12 million. Its stated objects are:

To improve the efficiency of the fractional horsepower electric motor industry;

To study and exchange information upon market requirements and conditions, both at home and overseas;

To provide an authoritative body of manufacturing opinion and experience which can represent the fractional horsepower electric motor industry to the Government and others;

To co-operate towards the establishment of British and international standards and also to study, and where appropriate make recommendations on, overseas and other standards and specifications.

A technical committee has already carried out valuable work covering the revision of specifications relating to fractional horsepower motors, the report states. Chairman of the Conference is Mr C. A. J. Martin (Crompton Parkinson), vice-chairman is Mr E. G. Milner (Hoover), and the secretary is Mr G. B. Wilkinson (BEAMA), at The Red House, Ascot, Berks.

# DEVELOPMENTS IN INDUSTRY

### CAPACITORS

AN agreement has been concluded between the Telegraph Condenser Co. Ltd. of the UK and Sprague Electric Co. of the USA under which TCC acquire the right to all Sprague patents and applications in Britain, together with the technical and engineering information necessary to exploit them. In addition, Sprague will make available to TCC all its present research and technical information. For the next 21 years the two companies will exchange research, development and manufacturing knowledge, extending beyond the field of capacitors and embracing all the companies' products, including printed circuits and ceramics.

### PHOTO ELECTRICS

A NEW company, Hird-Brown Ltd., with headquarters at 244 Marsland Rd, Sale, Cheshire, has been formed to design and manufacture photo-electric controls for industrial and other applications. The company has absorbed the activities of Paton Brothers Engineering Services, formerly carried on at the same address and at 15 St. James Row, Sheffield.

Joint managing directors are Mr T. Bryan Hird (formerly of Millspaugh Ltd. and Metropolitan-Vickers Electrical Co. Ltd.) and Mr Roy Brown (formerly of Metropolitan-Vickers Electrical Co.).

### LIGHT FITTINGS

ALL the share capital of New Endeavour Engineering Ltd. has been acquired by Grampian Holdings Ltd. for £113,500, of which £51,500 is a cash payment. New Endeavour is the beneficial owner of L. M. Boys and Brand Accessories. The group manufacture domestic light fittings and recorded a combined profit in 1959 of over £25,000.

### LIFTS

A £100,000 company, Platt-Schindler Lifts Ltd., has been formed to manufacture, sell, install and maintain lifts in the UK. The company is owned jointly by Stone-Platt Industries Ltd. and Schindler and Co., of Switzerland, who have been making lifts since 1874. The formation of the company follows an agency agreement between the two firms.

Platt-Schindler will offer the full range of Schindler-designed passenger, goods and service lifts. The board includes Mr A. P. H. Aitken (chairman), Mr P. A. Peterson and Mr J. H. Morris of Stone-Platt, and Mr A. F. Schindler, Mr H. Knoll and Mr O. L. Theiler of Schindler and Co.

### ALUMINIUM

A NEW £500,000 company, Alcan Enfield Alloys Ltd., is to be formed jointly by Aluminium Ltd., of Canada, and Enfield Rolling Mills Ltd. (Middlesex), to acquire the secondary aluminium smelter at Bradford operated by Enfield Rolling Mills (Aluminium) Ltd.

The new company will produce from scrap and primary aluminium a large range of foundry alloys not normally produced at the primary aluminium smelters of Aluminium Co. of Canada, the principal subsidiary of Aluminium Ltd. The alloys will be marketed in the UK by the Alcan (UK) Ltd. subsidiary of Aluminium Ltd. Managing director of the new company will be Mr. W. W. Kee.

### HYDRAULICS

TUBE Investments have acquired Loewy Engineering Co. Ltd., of Poole, makers of hydraulic machinery and rolling mill equipment. Loewy management remains unchanged, with Mr K. Guttenstein as chairman, and Mr E. K. L. Haffner and Mr M. Langen as joint managing directors.

## Free Washing Machines?

A PROPOSAL that washing machines should be provided free of charge to tenants in 130 new municipal houses to be built has been approved by Stevenston Town Council in Ayrshire. The tenants will be asked to pay a small maintenance charge.

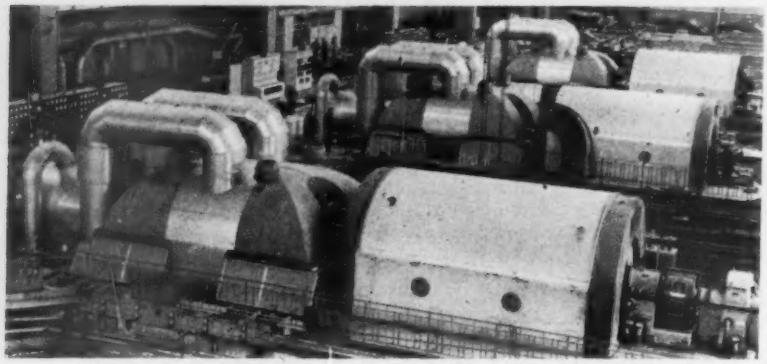
The scheme was opposed by a minority of councillors who feared further demands for free machines.

## Libel Action Begins

THE libel action against Sir Harold Bishop, director of engineering, BBC, brought by former BBC employee, Mr L. J. Peerless, began in the High Court on Monday. Peerless sued for damages, alleging that Sir Harold libelled and slandered him in communications to Sir Ian Jacobs, then director-general.

At the time, Mr Peerless was working under Sir Harold as a progress engineer. The latter denied writing or speaking the words complained of, or that they were defamatory of Mr Peerless in his profession.

*Fluorescent lighting by AEI in the cabin class restaurant of RMS "Amazon," one of three 20,000 ton ships built by Harland and Wolff for Royal Mail Lines Ltd., using a high proportion of fluorescent lighting, has resulted in a saving on lighting and air conditioning of over £12,000 a year. Some 2,000 fluorescent fittings are installed in each ship, running on 230 V supply*



## PROGRESS AT BRADWELL

*The main turbine hall at Bradwell nuclear power station, showing the state of progress, with three of the six 52 MW turbo-alternators installed. These machines are designed to take steam at 371°C, and two pressures, 745 and 195 p.s.i.a. The turbines have two cylinders with double-flow l.p. exhausting at 1·1" Hg. back pressure. Bradwell station, sited in Essex some 45 miles from London, incorporates two identical reactors of the graphite moderated gas-cooled type rated at 531 MW each, each having six boilers with independent gas circuits. The station is designed for a net electrical output of 300 MW*

# New work by B.S.I.

AMONG new work reported by the British Standards Institution this month are seven subjects of electrical importance. BS 2048, dealing with dimensions for f.h.p. motors is to be revised, with three new frames being considered additional to the present series. These will extend the range downwards, though it is not proposed to introduce any specific relationship between frame size and motor output.

Another revision concerns BS 469, covering electric lamps for railway signalling. Other lighting subjects include standards for threshold lights for aerodromes and for recessed double-contact lamp caps and lampholders for tubular fluorescent lamps (dealing with dimensions). A standard is to be prepared covering polyphase motor-type meters registering in kVArh or MVArh, and there is to be a document dealing with the performance and testing of complete electrical protective systems, excluding specific requirements for protective relays and instrument transformers.

Finally, work has begun on a standard giving requirements and methods of test for epoxide casting resin systems for electrical apparatus.

## Amenities "criss-crossed"

"THE increase in the demand for electric power is causing a serious deterioration in amenities, especially in South Essex, where the countryside is becoming criss-crossed with overhead high-tension lines," states the Essex County branch of the Council for the Preservation of Rural England in its annual report.

The report calls for a greater effort to force the electricity authority to put more lines underground and to simplify the overhead system. An effort should also be made "to procure a programme whereby over a period of years all village supply systems should be put underground."

## 275 kV Transformer Orders

EIGHT 275 kV transformers with a total capacity of nearly 1,600 MVA are to be built by Bruce Peebles and Co. for the South of Scotland Electricity Board. Four of the units are 240 MVA 275/132 kV auto-transformers which will be installed at Windyhill and Neilston transmission substations and are among the largest so far ordered for service in the UK.

Two 225 MVA 16/285 kV generator transformers, said to be the largest double-wound units yet ordered for service in Scotland, are for Kincardine "B" power station. The remaining units are two 90 MVA 275/33 kV transformers for Ravenscraig substation of the S. of S. EB; they will supply the new steel strip mill of Colvilles Ltd.

## Exhibition Dinner

THE first annual dinner of the Electrical Engineers' Exhibition will take place on 13 Oct. next at Grosvenor Hse, Park La, W.1, at 6 p.m. for 6.30 p.m. Tickets cost £2 2s each, but as the demand is expected to exceed the supply the organisers advise early application to: The General Manager, Electrical Engineers (ASEE) Exhibition Ltd., 6 Museum Hse, 25 Museum St. W.C.1.

# OBSERVATIONS ON EXPORTS

### Stop-and-Start Tactics

THE "start-and-stop" tactics of successive Governments were the reason why Britain was not getting her share of the growing world market. Brig G. V. Palmer, chairman of the council of the Institute of Export, stated at the Institute's silver jubilee meeting in London last week.

"One tenth of the money frittered away since 1948 in chasing the tail of the guided missile would, if intelligently spent in Commonwealth markets alone, have ensured our export markets for a generation," he added. "Then, instead of being panicked by the third German trade war, we might have stated our own terms for a European free trade area, thus emphasising our free trade policy and contributing to the increase of world prosperity."

### Investing in the Six

Practical information on the opportunities for investment in the European Common Market is contained in a useful 24-page booklet, *Aids to Investment in the European Economic Community*, published last week by the Association of British Chambers of Commerce.

American industry has invested heavily in the Six during the past year, the association points out. Though they have not discriminated against British capital, the countries of the Six have not yet undertaken the same organised publicity as in the US to attract British investment. Even so, a number of British firms have invested in the Common Market, and industries of the Six are beginning to move into the countries of the Seven.

The booklet gives details of concessions to industry and investment offered by the Common Market countries, with information on taxation, foreign exchange control, etc. For those who wish to pursue their inquiries further it also gives sources where further information may be obtained.

### Political Threat

One of the reasons why the Six and the Seven have so far failed to form a wider economic association is because the fundamental aim of the Common Market is complete political integration of the six nations concerned, the British National Committee of the International Chamber of Commerce state in their annual report published last week.

Economic arguments tend at best to take only second place when confronted by overriding political considerations, the report adds. Too rapid an implementation of Common Market internal tariff reductions and the adoption of a common external tariff might well dislocate the pattern of trade with non-EEC countries, and this could give rise to the risk of "a serious economic and perhaps political split in the Western nations."

The Committtee favours the establishment of an international institution charged with the duty of protecting the interests of private investors who have made investments abroad. This would complement a proposed international code for foreign investments.

## Kelvinator's Coffee Swop

KELVINATOR LTD. are to be paid 98½ tons of coffee for a cargo of 4,000 refrigerator compressors being shipped to Colombia, South America, where the firm's licensee, Industria Colombiana de Refrigeracion SA, who make 'fridge cabinets, but not the compressors, are hamstrung by the country's lack of sterling for imports.

Offered coffee instead of pounds, Kelvinator clinched the deal, having been assured by a London coffee broker and Barclays Bank that there was a market for coffee in the UK. Final arrangements have been completed and the compressors and coffee are crossing the Atlantic in opposite directions.

## £25,000 for Research

THE sum of £25,000 has been given by Mullard Ltd. towards the cost, estimated at £50.000 or more, of an extension to the Simon building, Clarendon Laboratory, Oxford. The extension, due to begin in 1961, will house a high-magnetic field laboratory on the first and second floors and a low-temperature workshop on the ground floor.

A statement on behalf of the university says that the Department of Scientific and Industrial Research has approved a grant of £25.000 for the scientific equipment of the building. The trustees of the Higher Studies Fund are making a grant of £10,000 towards the cost.

## PRICES of cable metals and other materials

*Figures quoted are the official prices ruling on Tuesday, June 21*

| | £ per ton | Weekly change £ |
|---|---|---|
| COPPER, standard class A (settlement) ... | 256 | +8 |
| " (3 months) ... ... | 246½ | +4 |
| LEAD, refined pig, 99·97% purity (cash) ... ... ... | 72½ | −½ |
| " (3 months) ... ... ... | 73½ | −¾ |
| TIN, refined, min. 99·75% purity (settlement) ... ... | 797 | +7½ |
| (3 months) ... ... ... | 789½ | +8 |
| ALUMINIUM, ingots 99·99·5% ... | 186 | — |
| " wire bars (4×4×54") | 193½ | — |
| BRASS Strip 63/37 ... ... ... | 220 | +3½ |
| SILVER (Troy oz) ... ... ... | 79½d | — |
| ZINC, virgin, min. 98% purity (cash) ... ... ... | 90½ | +½ |
| " (3 months) ... ... ... | 90 | — |
| RUBBER, per lb. | | |
| No. 1, R.S.S. spot ... ... | 39d | −1½d |
| c.i.f. basis, ports, Aug. ... ... | 35½d | +½d |
| ARMOURING: | | |
| Galv. Steel Wire (0·104 in.) ... | 66½ | — |
| Mild Steel Tape (0·04 × 1½ in.) | 53* | — |
| NICKEL (home) ... ... ... | 600 | — |
| MERCURY (76 lb flask) ... ... | 70½ | — |
| AMERICAN PRICES: | | |
| Copper, electrolytic (per lb) ... | 33c | — |
| Lead (New York) ... ... | 12c | — |

* *Tape Price, now on average, includes varnishing*

## Focus on Railway Electrification

RAILWAY engineers from five continents will be visiting the exhibition of new electric locomotives, rolling stock and a.c. electrification equipment built for British Railways to be held at Battersea Wharf, London, from 3 to 9 October next. The exhibition, said to be the most comprehensive of its kind ever staged in Britain, will be opened by the Minister of Transport at 3.15 p.m. on 3 October.

Among the specialised electrical exhibits is a traction motor which can be arranged to operate on the latest a.c. system, or on earlier systems, thus allowing dual operation across frontiers between areas using two different electrification systems.

Also on show: large concentric oil-filled cables for the transfer of electric power from the 132,000 V grid to BR feeder stations; switchgear specially designed for the control, protection and distribution of track-side electricity supplies on the 25,000 V a.c. system; pantographs for collecting current from overhead lines; airblast circuit-breakers designed for installation in the roof structures of locomotives to control the 25 kV input; and power couplers to convey h.v. safely from car to car throughout a train.

The exhibition is being organised by the Locomotive and Allied Manufacturers' Association of Great Britain and the British Electrical and Allied Manufacturers' Association in co-operation with the British Transport Commission. It will coincide with the British Railways Electrification Conference in London.

## *New Royalty Theatre opened*

THE first new theatre to be opened in the West End of London for nearly 30 years was officially named "The Royalty" by Dame Edith Evans last Wednesday. The theatre, which occupies part of the new building erected on the site of the Opera House built in Kingsway by Oscar Hammerstein in the first decade of the century and more familiarly known as the Stoll, takes over the mantle of the older theatre of the same name recently demolished in Dean Street.

The auditorium, 73 ft deep by 71 ft wide and 32 ft high, has seats for 997 people on two levels, and four boxes. The décor, in grey-green, gold and white, with red carpets, curtains and seating, is a tasteful compromise between Georgian and modern ideas.

The stage is provided with an adjustable opening, rising and falling orchestra pit, and two concentric turntables, the centre one of which can be raised or lowered electrically from 4 ft above stage to basement level. Fully automatic stage lighting, on a lavish scale, is controlled from a Strand console at the rear of the circle and Standard Telephone intercommunication systems ensure continuous contact between the stage direction, actors in their dressing rooms, the auditorium, lounges and technicians.

The architects and designers are Lewis Soloman, Kaye and Partners; the main electrical contractors for the stage equipment, Hall Stage Equipment Ltd.; lighting fittings and other electrical apparatus were supplied by GEC, and sound reinforcement equipment by Standard Telephones and Cables Ltd.

## *Sayings* OF THE WEEK

*"Co-operation means starting work at the starting time, finishing work on the finishing time, limiting lunch and other breaks to the agreed period. I estimate the increase in production would be in the region of 12½% if these rules were honestly observed."* . . . MR V. J. STOCK, retiring president of the ECA, speaking at the annual conference on claims for a shorter week in the industry.

*"If this country were flooded with a continuing increase in imports of fuel oil, sold at very low prices, amounting almost to dumping, the mining industry would face a very serious threat to its future security."* . . . SIR JAMES BOWMAN, chairman, NCB.

*"Who are the producers of consumer durable goods who will invest in new equipment at high rates of interest when their home markets are liable to shrink suddenly through Government action at two-year intervals?"* . . . D. C. TERRETT, writing to *The Times*.

## Tilbury "B"

THE new Tilbury "B" power station extension, to which we referred last week, is to have a total capacity of 1,400 MW, not 140 MW as was stated.

## News in Brief

The South Western Electricity Board has acquired premises adjoining its Plymouth showroom in New George St.

The UKAEA has set up the Isotope Information Bureau on the ground floor of its office in Charles II St, S.W.1.

The GPO has placed a £500,000 order for pay-on-answer telephone coil boxes with Associated Automation.

Mr A. D. Holmes won the Birmingham Electrical Golfing Society's Evening Competition, H. Martin being runner-up.

Igranic Electric have received an order worth over £100.000 for 23 sets of electrical controls for cranes at the new Richard Thomas and Baldwins' Spencer works at Llanwern.

Liverpool Corporation Electrical and Lighting Committee are considering staging a sound and light spectacle at Speke Hall.

# Company Activities

HOOVER hit the National headlines in no uncertain fashion last week with its announcement of proposed sacking of 800 workers. In the dealing day after the redundancy news the *Financial Times* industrial ordinary index dropped no less than 5·1 points to 320·9. Nearly all sections of stock markets suffered marking down, with the electrical issues particularly vulnerable. Hoover's bombshell that it would have to lay off so many in their washing machine, floor polisher and vacuum cleaner divisions carried so much more punch since it followed the previous day's headline that the high level of retail trade continued during May, although it was noted that there was some reduction in sales of durable goods such as household appliances. Within 24 hours we were then to learn that the Chancellor's hire-purchase restrictions had hit Hoover's home sales hard.

But City-wise there is much to be salvaged from all this. Many durable goods companies confirmed that the end-April restrictions are now biting into their sales. In recent weeks the City has been increasingly veering to the view that Mr. Amory's "slow-down" measures were not achieving the desired results and that this failure would inevitably lead to more drastic controls including, it was thought by some, an increased Bank Rate. Hoover, who saw its 5s "A" ordinary shares drop from 47s to 40s before steadying to 43s 1½d and then back to 42s, dramatically exploded the truth in the faces of both pessimists and optimists alike. But the conclusion must still be that the imminent likelihood of a further credit clamp-down will now be postponed. As this view gained currency towards the latter part of last week so there was in evidence a steadier tone returning to the City's share markets.

There is still, nonetheless, a very big question mark persisting over our Balance of Payments position. The latest Board of Trade figures show that the May trade gap was £61·1 million against £54·7 million in April. The rate of imports appears to have slowed, but on the other hand exports have failed to expand. In fact, so far this year, exports have been at a steady 9% higher than the 1959 average, but imports in the first five months of 1960 have been rising at 13% above last year's levels.

It is to be hoped that now that the payments position is likely to be eased by less call for electrical appliance imports, home manufacturers at the same time will exert extra effort to avoid sales reductions by selling more aggressively overseas. If not, they will be entitled to blame themselves as much as the Chancellor for any unfortunate consequences.

| | Opening Price 13 June | Closing Price 17 June | Rise Fall |
|---|---|---|---|
| A.E.I. £1 ord. ... | 58/- | 56/9 | —1/3 |
| Eng. Elect. £1 ord. | 41/3 | 38/6 | —2/9 |
| E.M.I. 10/- ord. ... | 52/3 | 47/9 | —4/6 |
| G.E.C. £1 ord. ... | 39/9 | 38/- | —1/9 |
| Hoover 5/- "A" ord. | 47/- | 42/- | —5/- |
| Morphy-Rich. 4/-ord. | 24/3 | 22/1½ | —2/1½ |
| Philips Lamps fl.10... | 10½ | 11 1/16 | +7/16 |
| Plessey 10/- ord. ... | 49/6 | 50/3 | +9d |
| Pressed Steel 5/- ord. | 35/- | 32/- | —3/- |
| J. & F. Stone 5/- ord. | 29/3 | 29/1½ | —1¼d |
| Thorn Elect. 5/- ord. | 52/6 | 52/- | —6d |
| Vactric 5/- ord. ... | 31/6 | 28/4½ | —3/1½ |

Meanwhile, investors with the long-term in view will make hay while the sun is clouded and cannot come to much harm by buying on the strength of the electrical market's recent falls. My table above shows how a number of electrical shares fared over the week, before and after the Hoover hoo-ha.—*From our City Correspondent.*

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### Allied Ironfounders

Group trading profits for the year to 2 April last increased to £2,946,532 (*£2,085,057*), and the dividend is also raised by 7½% to 20%, with a final of 12½%. It is stated that the higher profit reflects increased activity in all sections of the group's business and takes into account the elimination of the loss of £271,629 in Australia shown on the previous accounts and the inclusion of three months' additional profit from the South African subsidiary.

### Automatic Telephone and Electric Co.

Provisional allotment letters go out to stockholders on 24 June for the rights issue of 3,240,000 Ordinary 5s shares offered at 15s each on a one-for-five basis. The issue will be used to pay off the bank overdraft which was £2½ million on 31 December. The directors state that trading results for 1960 should be no less satisfactory than those for 1959 and they anticipate keeping the total dividend at 17%.

### Electric Construction Co. Ltd.

Before tax, the profit for the year to 31 March last is £192,570 (*£226,475*), but the dividend is maintained at 9%.

### Permali Ltd.

For the year ended 31 March last the profit of the British companies amounted to £102,393 (*£57,019*) before tax, and to this must be added the proportion of net profit from the North American subsidiaries of £5,609 (*£22,318 loss*). A final dividend of 6% makes the total 9% (5%).

### Richardsons, Westgarth and Co.

This group suffered a sharp drop in profits for the year to 31 March last. The total is down to £516,900, compared with £1,075,651 last time, but the dividend is unchanged at 10d per 10s share.

### Simon-Carves Ltd.

In view of statements on losses incurred by various groups on nuclear power station work, Mr R. B. Potter, chairman, points out that there is no evidence that substantial losses will be incurred by this company. In fact, with substantial sums written off in recent years, they have paid for the research and development expenses they have had to meet on nuclear power plant, he adds.

### Unidare Ltd.

The offer of 500,000 7% Redeemable Cumulative Preference shares of £1 at 20s 6d each opened and closed on Monday last, well over-subscribed, it is stated. The directors say the company will earn greater profits through increases in output and efficiency.

### Walsall Conduits Ltd.

There was a substantial increase in turnover last year, but reduced profit margins kept the trading profit little higher. The sales organisation has been further extended with three more depots to bring that total to 43. The subsidiary, A. G. Hackney and Co., also had a better year with a satisfactory increase in sales and profits, and Mr C. G. Maisey, the chairman, reports that that improvement continues. The group sales for the current year continue to rise.

| Year to 31 Dec. | £ Trading Profit | £ Net Profit | % on Ord. | | Ord. Price | |
|---|---|---|---|---|---|---|
| | | | Earned | Paid | High | Low |
| 1955 | 594,118 | 260,062 | 55 | 20 | 17/6 | 12/1 |
| 1956 | 727,594 | 319,166 | 68 | 20 | 13/9 | 10/9 |
| 1957 | 782,070 | 337,278 | 72 | 22½ | 15/7 | 10/10 |
| 1958 | 728,020 | 340,711 | 69 | 22½ | 18/7 | 11/- |
| 1959 | 743,512 | 358,707 | 41 | 15* | 15/10 | 9/7 |

* Plus 75% capital bonus.

### Ward and Goldstone Ltd.

Only a small increase in the group trading profit for the year to 31 March last is reported. The total is £1,087,356, as against £1,041,223 for the previous year, and after tax, etc., net profit is £495,457 (*£478,205*). In addition to raising the dividend by 5% to 35%, with a final of 25%, it is proposed to make a one-for-one scrip issue.

### B. S. and W. Whiteley Ltd.

Deliveries during the year ended 31 March last were a record both in tonnage and in value, and included a 25% increase in exports of "Elephantide." For the two months since March, trading has been on a slightly higher level than in the corresponding period of last year, Mr William Whiteley, the chairman, reports. Further capital expenditure is anticipated during the year in improvements to production, but available cash resources should be adequate to meet this.

### Dividend Declared

*International Combustion Africa.* Interim of 10%.

# COMMERCIAL INFORMATION

## Contracts Open at Home . . .

*Dates given are the final for receipt of tenders unless otherwise stated.*

**24 June—Dudley C.B.** Provision and erection of 705 Group "B" "Stanton" prestressed concrete columns, 90 Group "B" steel columns, and 10 Group "A" lighting points with mercury and some sodium lamps, lanterns and control gear.—See 16 June issue.

**24 June—Leatherhead U.D.C.** Supply, erection and putting to work of 31 30 ft steel columns with 200 W sodium lanterns on A24 at Ashtead.—See 16 June issue.

**25 June—Middlesbrough T.C.** Lighting and power installations at Beechwood and St. Hilda's C.E. schools. Director of Education, Woodlands Rd. Deposit £1 1s.

**25 June—Saddleworth U.D.C.** Supply and erection of: (contract 1) 121 units and (contract 2) 18 units, comprising concrete columns, brackets, lanterns, auxiliary equipment and wiring.—See 16 June issue.

**26 July—Saltash B.C.** Installation, complete, of a total of 46 units comprising Group "A" lighting in Fore St and Group "B" m.v. lighting in Callington Rd. Borough Engineer, A. de Barr, Church Hse. Deposit £2 2s.

**27 June—Lewisham B.C.** Removal of existing m.v. equipment and substituting 200 W linear sodium vapour lighting on 360 columns. Borough Engineer, Town Hall, Catford, S.E.6.

**27 June—Littleborough U.D.C.** Supply of 21 concrete Group "B" columns with 60 W sodium lanterns, lamps and auxiliary gear. Engineer and Surveyor, Council Offices.

**27 June—Manchester C.C.** Electrical installation including lighting, underfloor heating and small power to control building, Arnfield Treatment Wks, Tintwistle.—See 2 June issue.

**27 June—Sunderland C.B.** Electrical installation in 14 bungalows, The Oval, Southwick.—See 16 June issue.

**28 June—Manchester C.C.** Supply and erection of 415 V cables and auxiliary equipment for secondary sludge treatment plant at Davyhulme Sewage Wks extensions.—Advertised 26 May issue.

**29 June—Antrim R.D.C.** Supply and erection of fluorescent lamps at Muckamore and Templepatrick.—See 16 June issue.

**29 June—Brownhills U.D.C.** Supply and erection of 67 Group "A" reinforced concrete columns with supply and fixing of 250 W m.v. lamps, lanterns and gear. Engineer and Surveyor, Coombe Hse. Deposit £2 2s.

**30 June—Belfast C.C.** Applications invited for inclusion in select list for the supply and installation of passenger lifts in two 13-storey tower blocks of flats at North Queen St. Applications by 12 noon on above date to Town Clerk, J. Dunlop, City Hall.—See 16 June issue.

**30 June—Breconshire C.C.** Electrical installation sub-contract (No. 12) in erection of new council chamber.—See 16 June issue.

**30 June—Cardiff C.C.** Contract 5: Erection of 100 Class "A," 600 Class "B" concrete columns and complete installation of fluorescent and sodium lanterns, etc.—See 16 June issue.

**30 June—Denny and Dunipace T.C.** Provision of nine Group "A" points on Glasgow-Stirling Rd scheduled; (a) supply of steel columns; (b) supply of lanterns, lamps and auxiliary equipment; (c) supply of cable and accessories.—See 9 June issue.

**30 June—East Riding C.C.** Electrical services installation at Beverley county garage. County Architect, County Hall, Beverley.

**30 June—Edinburgh T.C.** Supply of three pumps, each of 250 g.p.m. at a 160 ft head capacity along with ancillary electrical equipment, sluice valves, etc., for installation at Fairmilehead.—See 16 June issue.

**30 June—Kettering B.C.** Provision of 81 400 W and 59 250 W m.v. units on steel columns; contracts as follows: (a) supply of lanterns/auxiliary gear/lamps; (b) supply and erection of columns with wiring/fitting of electrical equipment supplied by another firm; (c) whole work.—See 9 June issue.

**30 June—Llanelly B.C.** Laying and excavating of 750 yds of cable for mains connection of 245 street lighting units. Borough Engineer and Surveyor, Town Hall. Deposit £2 2s.

**30 June—Middlesbrough C.C.** Stripping of existing wiring and rewiring 24 fittings plus installation of six new fluorescent fittings at Dacre St Baths. Borough Engineer and Surveyor, Municipal Bldgs.

**30 June—N. Ireland Hsg. Trust.** Electrical installations in 46 dwellings in Rathcoole 8c (extension).—See 16 June issue.

**30 June—Offaly C.C.** Electrical installation in connection with alterations and reconstruction work at County Hospital, Tullamore. County Secretary, Courthouse, Tullamore. Deposit £6 6s.

**30 June—West Lothian C.C.** Separate trades tender electrical work in erection of 18 houses at Greenrigg, Harthill. Applications to County Clerk, J. Calder, County Bldgs, Linlithgow, by above date.

**1 July—Manchester C.C.** Electrical installation in day nursery at Daisy Bank Rd, Victoria Pk. City Architect, P.O. Box 488, Town Hall.

**2 July—Dagenham B.C.** Wiring by contractors on N.I.C.E.I.C. roll for lighting and power in 190 dwellings, Canvey Island Development, Contract 4. Borough Engineer and Surveyor, Civic Centre.

**2 July—Llangollen U.D.C.** Electrical installations in 20 houses at Maes Pengwern. Surveyor, H. G. Fawcett, Town Hall. Deposit £2 2s.

**2 July—Margate B.C.** Erection and internal wiring of 520 lighting columns with fluorescent and sodium lanterns complete. Borough Engineer and Surveyor, 38 Grosvenor Pl.

**4 July—Hillsborough R.D.C.** (a) Electrical installation in new offices.—See 9 June issue.

**4 July—King's Lynn B.C.** Dismantling of existing tungsten lighting and erection of tubular steel columns, wall brackets; fixing and wiring of lanterns, lamps and control gear for: (a) Group "A" 25 ft, 400 W mercury colour corrected lighting; (b) Group "B" 15 ft 125 W mercury and 45 W sodium vapour lighting.—See 16 June issue.

**5 July—Armagh C.C.** Electrical installation in Richmount new three-roomed school.—See 16 June issue.

**5 July—Bradford.** Electrical work in office block, warehouse and glass dept. for Rycroft and Co. Ltd.—See 9 June issue.

**5 July—Consett U.D.C.** Supply and erection of (a) 10 m.v. and (b) 56 sodium lanterns, poles, etc., for A692 and B6322 lighting. Surveyor, Council Offices, Medomsley Rd.

**5 July—Newcastle-on-Tyne C.C.** Supply and installation of lighting protection equipment to 13 blocks of 15-storey flats. City Architect, 18 Cloth Market.

**7 July—Hastings C.B.** Electrical installation in St. Paul's Primary School, Hortye Rd, St. Leonards. Applications, with deposit £3 3s, to Borough Engineer, E. O. Baxter, 37 Wellington Sq, by above date.—Advertised in this issue.

**8 July—Brighton.** First stage: Electrical installation on fixed-price basis in Brighton, Hove and Sussex Grammar School for Joint Education Committee. Borough Surveyor, Engineer and Planning Officer, 26-30 King's Rd, Brighton. Deposit £1 1s.

**8 July—Co. Derry.** Electrical installation in new voluntary secondary intermediate school for Rev. P. Dillon.—See 16 June issue.

**8 July—Darlington R.D.C.** Supply and erection complete of three recirculation pump sets with electric motors automatically controlled, two of 1,200 g.p.m. each at a 28 ft head and one of 100 g.p.m. against a 20 ft head.—See 16 June issue.

**8 July—Lichfield C.C.** Supply, erection and installation of 27 steel columns with sodium lanterns and ancillary equipment. City Engineer and Surveyor, D. Ogleby, Meredith Hse, 62 Wade St. Deposit £2 2s.—Advertised in this issue.

**9 July—Bridgwater B.C.** Supply and erection of 200 sodium and mercury/fluorescent lamps on 15 ft prestressed concrete columns plus the conversion of 50 tungsten units to mercury/fluorescent; contract includes the supply and jointing of underground cables.—See 2 June issue.

**11 July—Coseley U.D.C.** Erection of 195 Group "B" lighting units on concrete columns with the probability of a further 39 Group "B" and 20 Group "A" units. Council Clerk, J. C. Roper, Council Hse. Deposit £2.

**12 July—Ormskirk U.D.C.** Provision of additional power points plus renewal of

## Your Queries Answered

*Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries*

### *A Selection from the 106 queries answered this week*

**"Dietz" electric motors**—agents for? G.E.—Kandem Electrical Ltd., 711 Fulham Rd, S.W.6.

**"Swift" mincing machines**—makers of? L.E.—B. and P. Swift Ltd., Century Wks, Conington Rd, S.E.13.

**Gossen and Co., Erlangen, W. Germany**—agents for? K.C.S.—Averley Electric Ltd., Ayron Rd, Averley Industrial Estate, S. Ockenden, Essex.

**"Selecta" electric tools**—makers of? W.H.P.—B. Elliott and Co. Ltd., Victoria Wks, Victoria Rd, N.W.10.

**"Percon" lighting fittings**—suppliers of? T.E.—H. J. Baldwin and Co. Ltd., 132 Arkwright St, Nottingham.

**"Richard" shavers**—agents for? P.S.—B. H. Ries Ltd., 19-21 Hatton Gdn, E.C.1.

**"Mar-Tex" blankets**—makers of? L.E.B.—F. Marshall (Textiles) Ltd., Hollins Mill, Marsh, Huddersfield.

**"Gaylord Hauser" juice extractor**—suppliers of? E.E.—Life and Beauty Ltd., 5 Avery Row, W.1.

#### FURTHER ANSWER

**"Olympic" mixers**—agents for? D.S.—Metway Electrical Industries Ltd., Metway Wks, Canning St, Brighton 7, Sussex.

switchgear and lighting circuits in 77 houses. Council Surveyor, Council Offices, Burscough St.—Advertised in this issue.

**12 July—Queensbury and Shelf U.D.C.** Separate trade tender electrical work in erection of a pavilion, Shelf Hall Pk.—See 16 June issue.

**12 July—Southport C.B.** (1) Electrical installation sub-contract in proposed Occupation and Industrial Centre, Sandbrook Rd, Ainsdale.—See 9 June issue.

**13 July—Hertford B.C.** Applications for inclusion in select list of contractors for erection, columns, lanterns and equipment for (a) 300 400 W mercury fluorescent units; (b) 268 200 and 140 W sodium units; (c) 203 60 W sodium units; and (d) 338 100 W tungsten units on existing gas columns to Town Clerk, The Castle, by above date.—Advertised in this issue.

**14 July—Sunderland T.C.** Electrical installation in £16,000 community centre at Monkwearmouth Borough Architect, Grange Hse, Stockton Rd.

**15 July—Callander T.C.** Supply, erection and putting into service of 10 steel columns with 140 W sodium lanterns and auxiliary equipment for A81 lighting. Burgh Surveyor, Callander.

**18 July—Irwell Valley Water Board.** Supply and erection of automatic electric pumping plant, Whitfield, to deal with constant 2 m.g.d. flow.—See 2 June issue.

**22 July—Reading C.B.** Supply and installation of cables, switchgear, fittings and accessories for distribution, control and site lighting for new Manor Farm Sewage Disposal Works, which is under construction.—See 9 June issue.

**25 July—Forehoe and Henstead R.D.C.** (c) Electrical installation in Central Depot, Ketteringham. Engineer and Surveyor, W. A. Jones, 158 Ber St, Norwich. Deposit £2 2s, payable to R.D.C.

**26 July—Ilford B.C.** (a) Erection and connection of 1,000 columns; (b) cable laying, jointing and trenching; (c) thrust boring for Stage III of Group "B" street lighting. Borough Engineer and Surveyor, Town Hall. Deposit £2 2s.—Advertised in this issue.

**29 July—Brighton C.B.** Supply, erection and maintenance of three electrically driven submersible well pumps and four booster pumps with control gear, etc.—See 16 June issue.

**13 Sept.—Cardiff C.C.** Supply and erection of pumps, motors, switchgear, screens and other electrical and mechanical plant for complete pumping stations at Usk and Pontypool, contract B.2 of Llandegfedd scheme.—See 16 June issue.

**No date stated—Ayr C.C.** (1) Supply of concrete columns; (2) supply of electrical equipment; (3) erection; (4) supply of lanterns for 140 W SO/H lamps for Ballantrae A77 street lighting.—See 16 June issue.

**No date stated—Fishguard and Goodwick U.D.C.** Provision, erection and wiring of 19 140 W sodium lanterns on 25 ft steel columns and 33 brackets on existing wooden poles for A40 street lighting. Surveyor, Town Hall, Fishguard. Deposit £2 2s.

**No date stated—Scotland.** Supply of 1-200 kW 440 volt motor-driven induction heating generator, complete with condenser cubicle and all associated switchgear.—See 2 June issue.

**No date stated—Taf Fechan Water Supply Board.** Conversion to a.c. of treatment works at Pontsticill, near Merthyr Tydfil, including: (1) goods lift; (2) supply of pumps; (3) supply of air compressors; (4) supply of 415 V switchboard including 150 A c.b.; (5) supply of 250 yd cable; (6) supply of small geared motor units; (7) supply and installation of one 50 kW water turbine alternator set complete with switchboard; (8) supply and installation of cables, etc., for rewiring and wiring of new equipment by contractors on N.I.C.E.I.C. Roll.—Advertised 16 June issue.

# TRADE NOTES

**Change of Address.** As from 25 June, C. E. Sleeper Ltd. are moving to a larger and more modern factory at Ponsford Wks, Minehead, Somerset.

**London Offices.** Jones, Stroud and Co. have this week opened a London office at 7-8 Market Pl, W.1 (Telephone: Langham 9488), where Mr D. J. Dowling is responsible for the electrical insulation side of the business.

The London office and store of Irish Cables Ltd. at 19/21 Fitzroy St, W.C.1, is being transferred to 106 Garratt La, Wandsworth, S.W.18.

**Bearing Agency.** As a result of the acquisition by the Barden Corpn. of a substantial interest in E.M.O. Instrumentation Ltd., Western Rd, Bracknell, Berks, the latter concern has become the sole agent of Barden bearings in Gt. Britain.

**Distributors.** Optoshield Ltd., 146 Clerkenwell Rd, E.C.1, have been appointed sole distributors in Gt. Britain for Ampco spark-resistant tools.

**Peru Imports.** Among various items on which the import duty has been reduced by the Peruvian Government, are electric hand tools, electric sewing machines and passenger lifts of any kind, including moving staircases.

**Beama Contract Price Adjustment Formulae.** *For Electrical Machinery and Equipment.* For purposes of calculating variations in (*a*) "Rates of Pay"—the rate of pay for adult male labour at 17 June, 1960, shall be deemed to be 204s 6d; (*b*) "Cost of Material"—the index figure for materials used in the Electrical Machinery Industry at 17 June, 1960, is 117·0* (181·5*).

*For Turbo-Generating and Allied Plant.* For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at 17 June, 1960, shall be deemed to be 204s 6d; (*b*) "Cost of Material"—the index figure for Materials used in the Mechanical Engineering Industry at 17 June, 1960, is 126·5* (190·1*). "Blast Furnaces and Iron and Steel Melting and Rolling (1948 S.I.C. ref. 40/41)," 188·6*. Other Steel Goods, excluding tubes (1958 S.I.C. ref. 311/2), 128·5*. The price of brass condenser tubes ¾ in. o/d 18 s.w.g. on 17 June, 1960, is 4s 1½d per lb. *Provisional figure.

The figures in parentheses shown above relate to the earliest list of wholesale price index numbers in which the year 1949 is taken as the base 100. For the other figures 1954=100.

# . . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

**28 June—Italy.** N.A.T.O. Infrastructure contracts: telephone switchboard; stabilised power unit; telephone/telegraph line; telephone cable laying; and l.c. armoured cable. Ministero Difesa-Aeronautica-Ispettorato-Telecommunicazione Ed A.V., Ufficio N.A.T.O.-U.E.O., Viale Castro Pretorio, Roma. B.o.T. (GD/6723 (20 to 24)).*

**1 July—New Zealand.** 10,000 yd 3-core 0·15 sq in. and 5,000 yd 3-core 0·25 sq in. 11 kV cable. Chairman, Power Board Bldg, Queen St, Auckland. B.o.T. (ESB/15338/60).*

**4 July—Burma.** 150 rolls of 72 yd yellow insulating tape, 1 in. wide. Director-General, Union of Burma Purchase Board, St. John's Rd, Rangoon. B.o.T. (ESB/15618/60).*

**11 July—Australia.** Two 30 MVA 132 kV transformers for Vales Point Power Station. Commercial Manager and Secretary, E.C. of N.S.W., Sydney. B.o.T. (ESB/15376/60).*

**12 July—India.** 200 miles 7/·0975 and 100 miles 7/·1093 all aluminium conductors and accessories. Director-General of Supplies and Disposals. B.o.T. (ESB/15501/60).*

**15 July—S. Africa.** One 250 kVA transformer to specification DNTS—60L—134A. Secretary, Union Tender Board, 291 Bosman St, P.O. Box 371, Pretoria. B.o.T. (ESB/15381/60).*

**1 Aug.—Australia.** Main distribution and switching boards for Sydney South and Dapto; pump house sub-board for Dapto; two transformer and synchronous condenser unit boards for Sydney South and two transformer unit boards for Dapto. Commercial Manager and Secretary, E.C. of N.S.W., Box 5257, G.P.O., Sydney. B.o.T. (ESB/15915/60).*

**1 Aug.—India.** One 12-panel 11 kV 3-ph. 500 MVA switchboard for Indraprasha estate sub-station. General Manager, Delhi Electric Supply Undertaking, Rajghat, P.O. Box 589, New Delhi. B.o.T. (ESB/15571/60).*

**17 Aug.—India.** Outdoor structures, switchgear, control and protective equipment for Sumer Power Station of the Umiam H.E. Scheme. Additional Chief Electrical Eng., Assam State Electricity Board, Lachumiere, Shillong. B.o.T. (ESB/15522/60).*

**23 Aug.—Canada.** Three or four 75 MVA 14·4/230 kV main step-up transformers for Squaw Rapids. Saskatchewan Power Corpn. B.o.T. (ESB/15597/60).*

**2 Sept.—Malaya.** Contract 6. Seven transformers, 20 to 30 MVA and one 8 MVA for 132 kV system. Preliminary information from Preece, Cardew and Rider, 8-12 Queen Anne's Gate, S.W.1. Documents available on payment of £15.

# CONTRACTS PLACED

**Armagh.** Electrical installation in new office building for Ministry of Finance, Gordon and Co.

**British Railways (Scottish Region).** Electrical installation at new marshalling yard, Perth, James Scott and Co. (Electrical Engrs.) Ltd.

**Ealing B.C.** Supply and erection of columns, Abacus Engineering Ltd., £4,062; and supply of lanterns, A.E.I. Lamp and Lighting, £3,296 for Uxbridge/Broston Rds lighting. Recommended.

**Glasgow C.C.** Provision of lifts for Hutchesontown, Gorbals multi-storey flats, Glasgow Engineers Ltd., £41,622.

**Hastings B.C.** Supply of Class "B" lighting equipment: 144 c.i. columns, Revo Electric Co., £1,868; 60 lanterns, etc., A.E.I. Lamp and Lighting, £1,050.

**Huddersfield B.C.** Electrical installations including underfloor heating in two 11-storey blocks of flats, Northgate/Southgate, Vallance Electrical Engrs. Ltd.

**Longbenton U.D.C.** Supply and erection of 104 sodium vapour lighting units from Palmersville to Holystone and in Station Rd, from Burrado to Fordley roundabout, Engineering and Lighting Equipment Co.

**Newcastle-on-Tyne Hospital Board.** Electrical installation in new kitchen at Winterton Hospital, Sedgefield, Paterson and Co. Ltd., £1,431 15s 2d; X-ray processing equipment for Newcastle General, Philips Electrical, £665.

**Newcastle under Lyme B.C.** Electrical services installation at Roe La, C.S.M. School, Speed Electric Ltd., £4,392.

**N. Cambridgeshire Hospital M.C.** Wiring of Clarkson Hospital, Grensells Ltd., £5,360.

**Nottingham T.C.** Supply of 500 c.i. columns, Smedley Bros. Ltd. Recommended.

**Ripley U.D.C.** Supply, erection and wiring of 67 Class "B" concrete columns, Gallagher and O'Brien Enterprises Ltd., £2,235.

**Seaham U.D.C.** Wiring of 46 "Homeville" houses and flats in Central Area, John Calvert (Electrical) Ltd.

**Swinton and Pendlebury B.C.** Contracts 1 and 2 East Lancashire Rd lighting, Walker Installations, £2,982 and £4,412.

# BUSINESS PROSPECTS

**Abercarn U.D.C.** Tender: 152 Trinant houses. Engineer.

**Aylesham.** Welfare Committee plan £71,000 old peoples' home.

**Barking.** Ardin and Brookes, 129 Mount St, W.1, architects for £100,000 East St shopping centre.

**Barry C.C.** Planned £475,000 training college, County Architect.

**Beaconsfield.** Jesse Mead Ltd., Chesham, Bucks, contractors for £55,000 Ponds Home for Spastics.

**Birmingham.** Hawleys Bakeries, 198 Mosley St, plan Darwin St development, £100,000.—Geoffrey Dams and Lock, 51 Snow Hill, plan £40,000 Hampton St development.

**Bingley U.D.C.** Tender: 36 Poplar Hse, Bradford Rd, flats. Surveyor and Architect.

**Boston T.C.** £49,640 crematorium planned. Surveyor.

**Bournemouth.** Flight Refuelling (Holdings), Tarrant Rushton, Blandford, Dorset, plan factory.—L. J. Clarke plan Wallisdown Rd factory.—The Corporation plans £82,000 hostel for women and children.

**Bradford.** Busbys Ltd., Manningham La, plan £250,000 rebuilding, etc., scheme.

**Brentford.** Ronald Lyon Group, Lyon Rd, Hersham, Surrey, plan £120,000 head office.

**Bridlington B.C.** £29,750 Rigg Holdings factory planned. Architect.—G. French, 82 Promenade, plan ice cream factory on estate.

**Builth Wells.** Shropshire Fatstock Soc., Dale St, Craven Arms, Shropshire, plan £20,000 abattoir improvements.

**Cheshire C.C.** Weaver Hall site hostel planned.

**Chester.** Vauxhall Motors, Luton, plan Hooton Airfields land development.

**Clacton C.C.** Stage II St. Osyth's Training College extensions planned. £200,000. Architects, A. R. Dannatt and Son, 65a Duke St, Chelmsford.

**Crook.** West Hunwick Silica and Firebrick Co. plan £250,000 brickworks extensions.

**Cumbernauld Dev. Corpn.** Tender: 147 two-storey houses. Chief Architect.

**Darlaston U.D.C.** Tender: 24 houses, four blocks two flats and three blocks four flats. Engineer.

**Darlington.** R. W. Gregory and Ptnrs, Pilgrim Hse, Pilgrim St, Newcastle, consulting engineers for Memorial Hospital extensions.

**Dungannon.** Tender: New 200-bed hospital on site of S. Tyrone Hospital which is to be demolished. N. Ireland Hospitals Authority, 27 Adelaide St, Belfast.

**Durham.** Cordingley and McIntyre, Owengate, architects for St. John's College Hostel and dining hall.—T. Worthington and Sons, 178 Oxford Rd, Manchester, architects for Hatfield College additional accommodation.

**East Retford B.C.** Tender: 48 West Hill estate dwellings. Town Clerk.

**Eccles B.C.** Tender: 44 houses, two sites. Engineer and Surveyor.

**Exeter T.C.** Tender: 28 dwellings, three sites. City Architect.

**Farnham.** S.W. Metropolitan Regional Hospital Board plan rehabilitation centre. Board's architect, C. D. Andrews, 40 Eastbourne Terr, W.2.

**Flint B.C.** Tender: 87 Pen Goch dwellings. Engineer and Surveyor.

**Frimley.** L.C.C. plan £155,000 Burrow Hill Special School rebuilding scheme.

**Gateshead.** Armstrong Whitworth and Co. plan rebuilding of iron foundry.

**Glasgow.** Rubery Owen, 11 Royal Cres, plan 90,000 sq ft factory.

**Grangemouth.** Calor Gas Distributing Co., 178 Gt. Portland St, W.1, plan new depot on industrial estate.

**Hawick.** Lyle and Scott, Lothian St, plan £12,000 textile workshop.

**Hull.** J. T. Scotney, 21 North Walls, plan workshops, offices, canteen, etc.—Sutton-on-Hull Cast Stone Co. plan Leads Rd, Sutton, factory block.—Hull Pattern Works plan site development Stoneferry estate.—Robinson and Sawdon, Alexandra Rd, contractors for Papropack's Hexdon Rd offices.

**I.o.W.** Ronson Products, Randalls Rd, Leatherhead, and Decca Radar, 9 Albert Embankment, S.E.11, plan developments at Broadfields Farm and Somerton Aerodrome.

**Kingswood U.D.C.** Tender: 42 Pound Rd houses and flats. Clerk.

**Lancaster.** E. Committee plans Lancaster and Morecambe College of Art hostel.

**Leamington Spa.** Lockheed Hydraulic Brake Co. plan boilerhouse. Sidney Flavel and Co. plan boilerhouse. Milverton Laundry, 39a Rugby Rd plan Court St laundry/offices.

**Leicester.** £100,000 shop arcade on site of Royal Opera House planned for Lockers Estates, 5 Corporation St, Birmingham.

**Lindsey.** Cleethorpes Girls' Grammar School extensions planned. County Architect.

**Liverpool.** R. Costain (Liverpool), Barlows La, Fazakerley, contractors for £300,000 I. M. Marsh, Training College.

**Llandeilo R.D.C.** Tender: 16 flats, three sites. Engineer and Surveyor.

**Llandudno.** Welsh Regional Hospital Board, Cathays Pk, Cardiff, to develop Oakwood Pk Hospital to accommodate 450 beds.

**London.** Wallis Gilbert and Partners, 5 Cromwell Rd, S.W.7, architects for Brand and Co., Mayfair Works extensions.—S.W. Metropolitan Hospital Board plan £50,379 St. Benedict's Hospital nurses' home rebuilding.—Young and Hall, 9 Southampton Row, W.C.1, architects for Middlesex Hospital extensions.—Richardson and McLaughlan, 13 Mansfield St, W.1, architects for £100,000 Blagdon Investments warehouse.—Geo. Wimpey and Co., contractors for £820,000 Barbican E.C. offices.—Trehearne and Norman, Preston and Partners, 83 Kingsway, W.C.2, architects for Colonial and Mutual Life Assurance Society, Ludgate Hill offices.—Bertie Crewe and Kay, 1 Green La, N.W.4, architects for International Serum Co.'s Frith La office block.—Newman, Levinson and Partners, 9 Mansfield St, W.1, architects for J. F. Crosfield Holloway Rd offices.—Raglan Squire and Partners, 3 Hobart Pl, S.W.1, architects for Clapham Pk Rd office building.—Sydney Clough and Partners, 39 Devonshire St, W.1, architects for Larkhall La, S.W.4, building.—Griggs and Son, 58 Victoria St, S.W.1, contractors for six-storey office block, Hanover St.—Newman, Levinson and Partners, architects for Northfield Ave, W.13, office block.—Richardson and Houfe, 24 Queen Anne St, W.1, architects for 78 Bryanston Sq flats.—L.C.C. £70,000 improvement programme for lighting at Islington, Stepney and Lewisham homes for aged. The two former require complete renewal.

**London Airport.** J. K. Greed, 14 Hill St, Richmond, architect for new PanAm building.

**Mansfield.** Clay Foister, Clay and Ward, Redcliffe Works, plan industrial development, Southwell Rd.

**Middlesbrough.** Metropolitan Rly Surplus Land Co. plan £500,000 Dundas St redevelopment.

**Newcastle T.C.** Tender: 48 Shieldfield maisonnettes. Architect.

**Newport.** A. J. Seward (Engineering) plan 12,000 sq ft Cordes Works factory extension.

**Northallerton U.D.C.** Brierly, Lockenby and Keighly, 10 Lendal, York, architects for 22 houses, eight flats, Forest Rd estate.

**Northwich.** Regional Hospital Board plan Victoria Infirmary casualty department.

**Nottingham.** W. J. Simms Sons and Cooke, Haydon Rd, Sherwood, contractors for A. V. Martin Ltd., Springfield factory.

**N. Riding C.C.** Thornaby-on-Tees infant school planned.

**Peterhead.** Scottish Industrial Estates Ltd., 3 Woodside Pl, Glasgow C.3, contractors for Radiation Ltd. appliance factory.

**Preston.** W. C. Evans and Co., Chadwick Rd, Eccles, Lancs, plan £150,000 factory on site of Warton R.A.F. Station.

**Purfleet.** Thames Board Mills, Thames Mills, plan major extension programme.

**Queenborough.** C.A.S. (Industrial Developments), St. James' Hse, W.8, plan Whiteway Rd factory.

**Reading.** Petch and Fermaud, 12 Seymour St, W.1, architects for £75,000 W. H. Smith and Son warehouse.

**Richmond.** Reddick and Macdonald, 119 Victoria St, S.W.1, quantity surveyors for Sheen Rd offices.

**Ross-on-Wye.** H. J. Mein, 26 Clarendon St, Nottingham, architect for Camp Meadow factory for Woodville Rubber Co.

**Rotherham.** Steel, Peach and Tozer Ltd. plan £1 million extensions.

**Ryde.** Columbia Products, 1 Duke's Ave, Chiswick, W.4, plan factory.

**St. Albans.** Three Hands Products, South Grove, N.15, plan Porter's Wood factory.

**Saffron Walden.** Essex Welfare Committee plans £70,000 old people's home.

**Salford.** R. A. Brand and Co., Bridge Paper Mills, plan factory and office extensions.—Ward and Goldstone, Frederick Rd, Pendleton, Manchester 6, plan rebuilding factory.

**Salisbury.** Wessex Hospital Board, Winchester, plan Odstock Hospital Improvements.

**Scotland.** Tender: new ITA transmitting stations, Mongour and Roskill. Architects: E. R. Collister and Assoc., 70 Victoria St, S.W.1.

**Sedgefield.** Kitching and Co., 21 Albert Rd, Middlesbrough, architects for conversion of Gaiety Cinema, Ferryhill, to dance hall.

**Selby U.D.C.** Tender: 36 houses, 12 bungalows, Stainer Wood and Flaxley Rd estates. Architect.

**Sheffield.** Husband and Co., 388 Glossop Rd, Sheffield 10, contractors for nine-storey Durham Rd office block.

**Shotley.** P. H. Knighton, Benfield Rd, Newcastle, architect for Shotley Bridge Hospital outpatients' department.

**Shrewsbury.** Laing Development Co., Page St, N.W.7, contractors for shop/office block development scheme.

**Spennymoor.** Arndale Property Trust, Bank St, Bradford, plan town centre.

**Stockton-on-Tees.** Corporation plan £125,000 bus station.—Reay Brass Foundry Ltd., West Row, plan Portrack trading estate factory. Miller and Gordon, Orwell St, Middlesbrough plan, warehouse block, Harterton Rd.

**Stoke-on-Trent.** G. Percy Trentham, Park Hall Depot contractors for £130,000 Harmil Bakeries Ltd. extensions.

**Stratford upon Avon.** Wood, Kendrick and Williams, 57 Colmore Row, Birmingham 3, architects for £75,000 library, study and administration block, Henley St.

**Sunderland.** J. H. Ainslie and Co. plan East Cross St industrial development. Newrick and Blackbell, 58 John St, architects for Sunderland and District Spastics Society works centre.

**Thedwastre R.D.C.** Tender: 18 bungalows on four sites. Architects: Mitchell and Weston, 38 Churchgate St, Bury St. Edmunds.

*Business Prospects—Continued*

**Torquay.** Sifam Electrical Instrument Co., Leigh Court, Higher Lincombe Rd, plan factory, Old Woods Trading Estate.

**Uxbridge.** P. Ingram and Co., 25 Catherine Pl, S.W.1, quantity surveyors for Bell Punch Co. extensions, The Island, Uxbridge.

**Wakefield.** Leeds Regional Hospital Board, Pk Parade, Harrowgate, plan £127,000 Manygates Hospital development scheme.

**Warmsworth.** H. Marshall and Sons plan 46 houses and 16 bungalows.

**Warwick B.C.** Tender: 27 East End dwellings. Borough Engineer.

**Watford.** R. H. O. Wills Ltd., promoters of £2 million Lower High St redevelopment.

**Welwyn Gdn City U.D.C.** Tender: 222 houses, 40 two-storey flats. Architect: Charles W. Fox. Nat. Prov. Bank Chmbrs, Stonehills, Welwyn Garden City.

**Wembley.** Samuel Avel, 11 Arkley La, Barnet, Herts, architect for Clearex Products Ltd., Heather Pk Drive factory.—E. Firmin and Partners, Thavies Inn Hse, Holborn Circus, E.C.1, architects for Associated Lead Manufacturers' planned extensions.

**West Bromwich.** £100,000 enlargement of National Foundry Training Centre hostel.

**Weston-super-Mare B.C.** Tender: 108 dwellings, Bourneville housing estate. Banks, Wood and Ptnrs, 41 Alma Rd, Clifton, Bristol, quantity surveyors.

**Wilmslow.** Finnigans, Alderley Rd, plan £100,000 store premises extensions.

**Winchester.** Wessex Hospital Board, plan Royal Hampshire County Hospital nurses' school.

**Woodbridge U.D.C.** Tender: 48 Castle St flats. Surveyor's Dept., Eden Lodge.

# Gazette Announcements

COMPANIES ACTS

**Lamberts (Farnham Rd) Ltd.** Creditors to send details to C. Talfourd-Cook, 64/65 St. Mary's Butts, Reading, or R. A. Hawken, Bank Chmbrs, 1 John St, Bedford Row, W.C.1, the joint liquidators, by 23 July.

**Carowe Electrical Co. Ltd.** Creditors to send details to liquidator: H. B. Britcliffe, 15 Avenue Parade, Accrington, by 7 July. Formal notice, all creditors to be paid in full.

**Lukalux Electrical Appliances Ltd.** Liquidator: F. M. Collins, Inveresk Hse, 346 Strand, W.C.2, released as from 31 May.

**D. F. Saint Ltd.** Mr D. T. Bainbridge, 7 Victoria Rd, Darlington, appointed liquidator at extraordinary general meeting on 8 June. Creditors to send details to liquidator by 29 July.

**Mica Mnfg. Co. Ltd.** General meeting of members to be held at 62 New Broad St, E.C.2, on 15 July, at 10.30 a.m., for the purpose of having an account laid before them.

**Loughton Radio and Electrical Co. Ltd.** Final general meeting to be held at offices of John Baker Sons and Bell, 88 Leadenhall St, E.C.3, on 22 July, at 3.15 p.m., for the purpose of having an account laid before the members.

**Vuma Ltd.** Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 27 June. Persons intending to appear to notify Cochrane and Cripwell, 119 Finsbury Pavement, E.C.2, by 1 p.m., 25 June.

**Frank Hancock (1939) Ltd.** Mr P. J. Snow, 17 Albion St, Hanley, appointed liquidator at extraordinary general meeting on 15 June.

**Lydiate Television and Electrical Co. Ltd.** Resolution for voluntarily winding-up passed at extraordinary general meeting of members on 8 June.

**L and K Electrical Installation Ltd.** First meetings of creditors and contributories to be held at Room 401, Inveresk Hse, 346 Strand, W.C.2, on 29 June, at 2.30 and 3 p.m., respectively.

**Ranelagh (London) Ltd.** First meetings of creditors and contributories to be held at Room 401, Inveresk Hse, 346 Strand, W.C.2, on 28 June, at 10.15 and 10.45 a.m., respectively.

BANKRUPTCY ACTS

*Receiving Orders*

**Coventry.** D. A. Jolley and J. F. Laight, retailers, formerly carrying on business as Supreme Electrical Products at 105 Far Gosford St, Coventry. Receiving order dated 9 June.

**Macclesfield.** C. Davies, electrical contractor, of 39 Moss Brow, West Bollington, Chester. Receiving order dated 7 June.

**Southampton.** D. G. Mayell, electrical contractor and domestic appliance retailer, carrying on business as Electroservice at 82 Park Rd, Freemantle. Receiving order dated 9 June.

**St. Albans.** D. L. Boak, electrical goods dealer, of Brigadoon Hse, Ellingham Rd, Hemel Hempstead, Herts. Receiving order dated 9 June.

**Salford.** H. Vickers, electrical goods retailer, formerly carrying on business as Victric Co., at 425 Bury New Rd, Higher Broughton. Receiving order dated 15 June.

*Dividend*

**Ashton-under-Lyne.** D. R. Kemp, electrical contractor, formerly carrying on business as Batty and Jackson at North Mill, Katherine St. Dividend per £: 9¼d, payable at Official Receiver's Office, 20 Byrom St, Manchester 3, on 28 June.

*First Meeting and Public Examination*

**High Court of Justice.** H. I. Saffer, dealer in electrical appliances, formerly carrying on business as H. I. Saffer at 91 Tabernacle St, E.C.2, and as H.S. Electrical Appliances at 158 Stoke Newington Church St, N.16. First meeting: 11 a.m., 23 June; and public examination: 11 a.m., 22 July, both at Bankruptcy Bldgs, Carey St, W.C.2.

*Appointment of Trustee*

**Newport and Ryde.** A. H. Percival and J. R. Marsh, electrical dealers and contractors, carrying on business as Albert H. Percival and Co. and "Top Twenty" at 13/14 Spencer Rd and 16 Union St, Ryde. Mr R. G. B. Booth, 21 The Ave, Southampton, appointed trustee as from 10 June.

# NEW COMPANIES

*Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.*

**H. M. Briscoe Ltd.,** 11 Waterloo St, Leeds. Manufacturers of and dealers in electrical goods, etc. Nom. cap.: £100. Dirs.: Harold M. Briscoe and Derick Overend.

**De Light Electricals and Home Supplies Ltd.** Manufacturers of and dealers in machinery, metals, hardware, holloware, domestic equipment and accessories, etc. Nom. cap.: £100. Dirs. not named. Subs.: Sydney H. Gow, Ada Cottage, Forest Row, Sussex; and Mrs Hilda M. Ashington, 34 Benhurst Ave, Elm Park, Hornchurch.

**Develectron Ltd.** To carry out research into, and develop the design of electronic equipment and components, etc. Nom. cap.: £5,000. Dirs. not named. Subs.: William H. Hammond, 3 The Spinney, Stanmore, Middx; and Bertram B. Davis, 271 Southcroft Rd, Streatham, S.W.16.

**Dodd Transformers Ltd.,** 2a The Broadway, Penn Rd, Beaconsfield, Bucks. Manufacturers of and dealers in dynamos, motors, transformers, etc. Nom. cap.: £100. Dirs.: John Codling and Miss D. Taylor.

**Flexlite Ltd.** Manufacturers of and dealers in flexible arm industrial local lighting fittings, etc. Nom. cap.: £5,000. Dirs.: to be appointed by subs. Subs.: Arthur V. Hawkins, 37 Colebrook Rd, Shirley; and Maurice M. Timms, 87 Westridge Rd, Kings Heath, Birmingham 14.

**C. M. King (Electrical) Ltd.** To take over the business of electrical engineers and contractors carried on by C. M. King at 104 Borstal Rd, Rochester, and at other addresses as "C. M. King," etc. Nom. cap.: £3,000. Dirs. to be appointed by the subscribers. Subs.: Colin M. King and John E. Stephens.

**Paul Equipment Ltd.,** 2a Churchill Way, Cardiff. Electricians, electrical, electronic and general engineers, etc. Nom. cap.: £100. Dirs.: Paul E. T. Gwyther and Eric S. Halford.

**Purewell Electrical Co. Ltd.,** Office Chmbrs, Lansdowne Hse, Bournemouth. Nom. cap.: £1,000. Permanent dirs.: Arthur J. Griffiths and Mrs Doreen A. Griffiths.

**Radcliffe Engineering Co. Ltd.,** Glebe Engineering Wks, Radcliffe, Lancs. To acquire the business of engineers specialising in the manufacture and maintenance of plant, machinery and equipment for the paper-making industry formerly carried on by a company of same name (now in liquidation), etc. Nom. cap.: £2,000. Dirs.: Jack P. Lord, David Ogden and Frank Heywood.

**Regal Electrics Ltd.,** 53 High St, Fareham. To take over the business of selling agents of domestic electrical appliances carried on by E. W. Gascoigne and T. Nash at Fareham, etc. Nom. cap.: £1,000. Dirs.: Edward W. Gascoigne and Thomas Nash.

**Rownick Electrical Supply Co. Ltd.,** Lionel Rd, Kew Bridge, Brentford, Middx. Nom. cap.: £2,000. Dirs.: Ronald S. Rowlands and Fdk. E. Nicholls.

**Reg. Taylor and Co. Ltd.,** 16 Beaumont St, Oxford. To take over business of bicycle dealers and electrical engineers carried on at 285 Iffley Rd, Oxford, by R. W. Taylor, H. W. J. Cullimore and I. K. Dopson. Nom. cap.: £6,000. Dirs.: Reginald W. Taylor, Harry W. J. Cullimore and Ivor K. Dopson.

**Weston Alarms Ltd.,** 2 Pond Pl, S.W.3. Manufacturers and dealers in safes, fire extinguishers, burglar alarms, etc. Nom. cap.: £100. Dir.: Martin R. Harding.

# MEETINGS TO NOTE

## THURSDAY, 23 JUNE

I.E.E. Conversazione. Royal Festival Hall. 7.30 p.m.

A.S.E.E. (S. London Branch). "Heat Storage," R. Jackson. Greyhound Hotel, High St, Croydon. 8 p.m.

## SATURDAY, 25 JUNE

INTERNATIONAL MACHINE TOOL EXHIBITION at Olympia until 8 July.

# TRADE MARKS

*This information is extracted from the Official Journal by permission of the Controller.*

**Buckland.** 781,883. Class 9. Accumulators, etc. Buckland Battery Co., Hersham Trdg Estate, Walton-on-Thames.

**Fildenex.** 801,008. Class 11. Lampshades, etc. H. W. Field and Son Ltd., Cable Wks, Station Rd, Harold Wood, Essex.

**Huntalic.** 801,808. Class 9. Capacitors. A. H. Hunt (Capacitors) Ltd., Bendon Valley, Garratt La, S.W.18.

**Hydrodist** and **Aerodist.** B791,819/20. Class 9. Electrical and radio line measuring instruments, etc. Tellurometer (Propriety) Ltd., Rustica Hse, Main Rd, Plumstead, Cape Province, S. Africa.

**Resmet.** 798,164. Class 9. Contacts. Metro-Cutanit Ltd., Grappenhall, Warrington.

**Varnite.** 800,849. Class 17. Insulation materials being steel in sheet or strip form and having an electrical insulation surface. Steel Co. of Wales Ltd., Newport Division, Orb Wks, Newport, Mon.

# HIGHEST PRESSURE TURBINE BUILT IN BRITAIN

## now in operation

Richardsons Westgarth are proud to be associated with yet another pioneering development in the engineering field.

The first British built turbine to operate on steam at 3000 lb./sq.in. is now generating power at the Steel Company of Wales Margam 'B' Power Station.

Built by Richardsons Westgarth (Hartlepool) Ltd. to Brown-Boveri design, this 'topping' turbine is designed to operate at 3000 lb./sq.in. at 1050°F. and to exhaust at 650 lb./sq.in.

In addition to Turbo-alternators, Richardsons Westgarth supply most of the main items for public electricity supply and industrial use, including Steam and Gas Turbines to Brown-Boveri design, Water Tube Boilers to Foster-Wheeler design, Economic Type Boilers, Feed Heaters, Condensers, Cooling Water Strainers and Vacuum Flash Sea-water Evaporators for industrial and domestic application.

BRIEF SPECIFICATION

| | |
|---|---|
| *Continuous maximum rating* | *9500 kW* |
| *Turbine speed* | *9500 r.p.m.* |
| *Alternator rotor speed* | *3000 r.p.m.* |
| *Generator voltage* | *10,500/11,500* |
| *Power-factor* | *0.7 lagging* |
| *Steam pressure at turbine stop valve* | *3000 p.s.i.g.* |
| *Steam temperature at turbine stop valve* | *1050°F.* |
| *Steam pressure at exhaust outlet* | *650 lb./sq.in. gauge.* |
| *Steam temperature at exhaust outlet* | *670°F.* |
| *Distance between turbine bearing centres* | *6ft. 6in.* |
| *Weight of turbine rotor* | *1300 lb.* |

## RICHARDSONS WESTGARTH (HARTLEPOOL) LTD

*A member of the RICHARDSONS WESTGARTH GROUP*

HARTLEPOOL, CO. DURHAM AND 58 VICTORIA ST., LONDON, S.W.1
59 MOSLEY ST., MANCHESTER AND 75 BUCHANAN ST., GLASGOW

R.W. 62

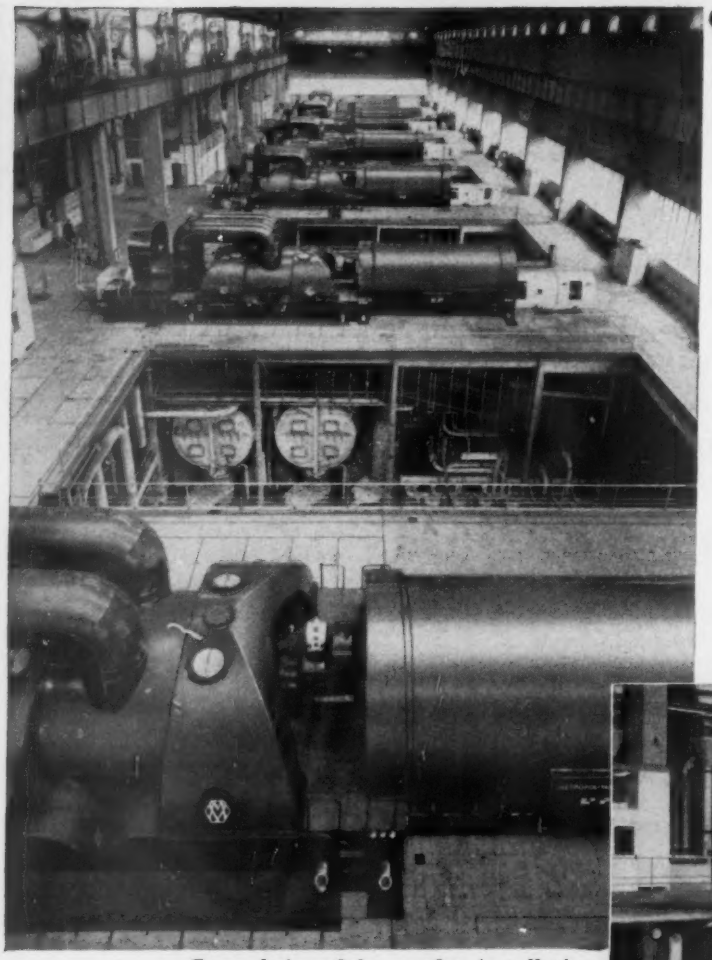
# CASTLE DONINGTON

## C.E.G.B. East Midlands Division.

### The largest single thermal power station in Western Europe

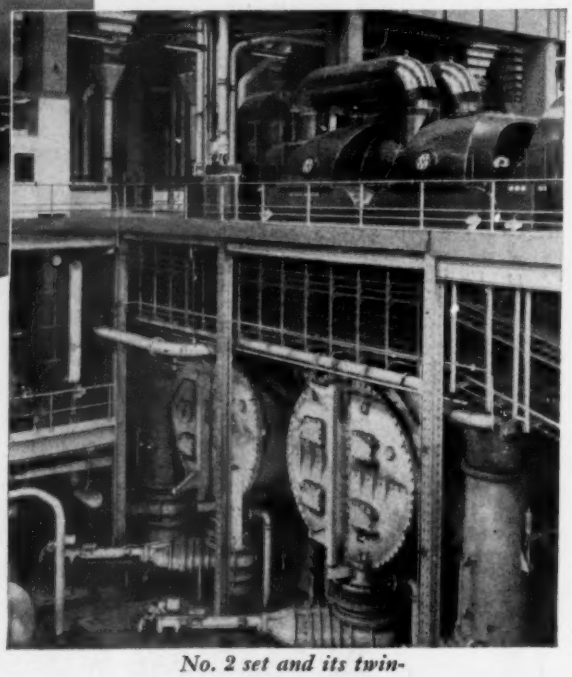
Castle Donington houses six 100 MW 3000 rpm steam turbine-generators together with their associated condensing plants and feedwater heating equipments. All this power plant was manufactured by A E I Turbine-Generator Division.

Castle Donington recorded the highest average overall thermal efficiency of any British power station during the three years ending 31st March 1959.



*General view of the complete installation of six 100 MW turbine-generators*

The two-cylinder, close-coupled turbines operate with steam conditions at the turbine stop valve of 1500 psig, 1050° F and exhaust to A E I condensers.
Direct-coupled generators produce 3 phase, 50 c/s alternating current at 13·8 kV. The rotor windings are directly cooled by hydrogen circulating in contact with the copper.
The generators are directly connected to the A.E.I. main step up transformers and the power is controlled to the grid by A E I circuit-breakers.



*No. 2 set and its twin-shell A E I Condenser.*

AEI

## Associated Electrical Industries Limited

### TURBINE-GENERATOR DIVISION

Enquiries to: A E I Turbine-Generator Division; Trafford Park, Manchester 17.

WORKS AT MANCHESTER AND RUGBY, ENGLAND · GLASGOW, SCOTLAND · LARNE, NORTHERN IRELAND

# CLASSIFIED ADVERTISEMENTS

## TENDERS INVITED

### CITY AND COUNTY OF LICHFIELD

GROUP "A" STREET LIGHTING
WALSALL ROAD A461

TENDERS are invited for the supply, erection and installation of 27 Steel Columns together with Sodium Lanterns and all ancillary equipment.

Application for Contract Documents should be made to the City Engineer and Surveyor, Mr D. Oglesby, M.I.MUN.E., Meredith Hse, 62 Wade St, Lichfield.

Applications must be accompanied by a deposit of £2 2s which is returnable on receipt of a bona fide Tender not subsequently withdrawn.

Tenders in a plain sealed envelope endorsed "Street Lighting A461" must be received by the undersigned not later than noon on Friday, 8 July, 1960.

The City Council does not bind itself to accept the lowest or any Tender.

HENRY J. CALLENDER,
Town Clerk.

Guildhall,
Lichfield. (R 194)

### COUNTY BOROUGH OF HASTINGS

ST. PAUL'S PRIMARY SCHOOL
HORNTYE RD, ST. LEONARDS-ON-SEA

ELECTRICAL Contractors desirous of tendering for the electrical installation at the above are invited to submit their names to E. O Baxter, M.ENG., A.M.I.C.E., Borough Engineer, 37 Wellington Sq, Hastings, together with a deposit of £3 3s (refundable on receipt of a bona fide tender) not later than 12 noon on Thursday, 7 July, 1960.

Tender documents will be forwarded to applicants immediately they become available.

N. P. LESTER,
Town Clerk.

Town Hall,
Hastings. (R 217)

### BOROUGH OF HERTFORD

STREET LIGHTING CONVERSION AND IMPROVEMENT SCHEME

THE Corporation propose to carry out the above scheme during 1960 and 1961 and intend to invite tenders from short lists of erection contractors, column manufacturers and suppliers of lanterns and equipment. Experienced firms are now invited to submit their names for inclusion on these lists.

The scheme will include:

(a) 30 No. 400 watt mercury fluorescent units in the Town Centre.
(b) 268 No. 200 watt and 140 watt sodium units on the main traffic routes.
(c) 203 No. 60 watt sodium units on the secondary traffic routes.
(d) 338 No. 100 watt tungsten units, using existing gas lamp columns in residential areas.

Applications by letter in suitably endorsed envelopes to be received by the Town Clerk, not later than 9 a.m. on Wednesday, 13 July, 1960.

A. I. CLOUGH,
Town Clerk.

The Castle,
Hertford.
16 June, 1960. (R 221)

### ORMSKIRK URBAN DISTRICT COUNCIL

ELECTRICAL WORKS, BURSCOUGH

TENDERS are invited for additional power points, renewal of switchgear and re-wiring of lighting circuits in 77 Council houses.

Tender documents available from the Surveyor to the Council. Tenders in plain sealed envelopes endorsed "Electrical Works" are to be returned to the Clerk of the Council not later than 10 a.m. on 12 July, 1960.

G. WILLIAMS,
Clerk of the Council.

Council Offices,
Burscough St,
Ormskirk. (R 242)

### BOROUGH OF ILFORD

STREET LIGHTING GROUP "B"
DISTRICT ROADS SCHEME—STAGE III

TENDERS are invited from experienced Contractors for the following work in connection with this Scheme:

(a) Erection and connection of approximately 1,000 No. Columns.
(b) Cable laying, trenching and cable jointing.
(c) Thrust boring.

The thrust boring equipment will be supplied by the Council.

Conditions of Contract and other documents may be inspected at the office of the Borough Engineer and Surveyor, Town Hall, Ilford, from whom the Specification, Bills of Quantities and Tender Form may be obtained upon payment of £2 2s, which will be refunded on receipt of a bona fide tender, and all documents not subsequently withdrawn.

Tenders in a plain sealed envelope bearing no name or mark indicating the tenderer and endorsed "Tenders for District Roads Lighting Scheme—Stage III," must be delivered to the Town Clerk, Town Hall, Ilford, not later than 4 p.m. on 26 July, 1960.

The Council do not bind themselves to accept the lowest or any tender. (R 241)

## APPOINTMENTS VACANT

### CENTRAL ELECTRICITY GENERATING BOARD

**South Eastern Division**

COMMUNICATIONS ENGINEER
VACANCY No. 94A/60.

A FOURTH ASSISTANT ENGINEER (Communications) is required in the Electrical Engineer's Department based at Northfleet Power Station.

Duties will include maintenance of automatic telephone and V.H.F. radio equipment. Applicants should have had training and experience with the G.P.O. or with a manufacturer preferably specialising in radio or electronics and should possess H.N.C. or equivalent.

Salary: N.J.B. Schedule B, AX/DX, Grade 7, £890/£1,090, including London Allowance. Applications giving age, details of training, experience, present salary, etc., should be sent to the Personnel Officer, Central Electricity Hse, Lower Ham Rd, Kingston upon Thames, Surrey, to arrive 7 July, 1960.

W. H. DUNKLEY,
Divisional Controller.
(R 255)

### THE NORTH WESTERN ELECTRICITY BOARD

PRINCIPAL ASSISTANT (COMMERCIAL)
SUB-AREA COMMERCIAL DEPARTMENT
MANCHESTER

DUTIES include assisting in the general organisation of sales activities in the Sub-Area, particularly relating to domestic and commercial consumers. Applicants should have had a wide experience in the organisation and supervision of service centres; planning sales campaigns; preparation of staff training lectures, interior and window displays and exhibition layouts; preparation and giving of lecture demonstrations to outside organisations; and dealing with all types of correspondence from domestic and commercial consumers. Technical knowledge of appliances and installations will be an advantage.

Salary scale: £1,070 x £30—£1,160 p.a. Grade 7. N.J.C. Conditions.

Application forms to be obtained from the Manager (Staff Vacancy), No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester 2. P.O. Box 493, and returned to him by 6 July, 1960.

DRAUGHTSMAN (ELECTRICAL)
SUB-AREA ENGINEERING DEPARTMENT
OLDHAM

Applicants should have had a sound drawing office experience and a good technical education.

Salary scale: £640/£725 p.a. Grade L.18 N.J.B. Conditions.

Application forms to be obtained from the Manager, No. 3 Sub-Area, The North Western Electricity Board, Union St, Oldham, and returned to him by 9 July, 1960. (R 229)

### CENTRAL ELECTRICITY GENERATING BOARD

**Eastern Division**

APPLICATIONS are invited for the following appointment:

FOURTH ASSISTANT ENGINEER
DIVISIONAL ELECTRICAL DEPARTMENT
LUTON TECHNICAL SECTION (BEDS)

Salary: N.J.B., Class AX/DX, Grade 8, £735 x £25—£860/£935 per annum.

The commencing salary will depend upon qualifications and experience.

Previous experience in the commissioning of high voltage electrical apparatus and associated protective gear would be an advantage.

The appointment will provide a basis for promotion to a higher technical grade and applicants should possess qualifications of Higher National Certificate standard.

The applicant appointed will be required to reside in the Luton area.

Applications, quoting Staff Vacancy No. 1344, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, by 2 July, 1960. (R 198)

### LONDON ELECTRICITY BOARD

ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the above position in the Ravensbourne District, Sydenham, S.E.26.

Candidates should have a good general and technical education and be in possession of the Ordinary National Certificate, be neat and capable draughtsmen and be experienced in one or more of the following subjects: drawing office routine, electrical diagrams, layout of plant in transformer chambers, mains survey and recording of mains work.

The post is graded under Schedule D of the National Joint Board Agreement as Grade 6, £660/£780 per annum, inclusive of London Allowance.

Application form obtainable from Personnel Officer, 46 New Broad St, E.C.2, to be returned within 14 days of the publication date of this advertisement. Please quote ref. PER/V/2996/T. (R 234)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 40s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

## MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

### Birmingham & District Sub-Area

SECOND, THIRD AND FOURTH ASSISTANT ENGINEER
(TECHNICAL AND PLANNING SECTION)
(HEADQUARTERS)

Suitably qualified Engineers are required for the above posts, to be responsible for, and to assist with, analysis of loading conditions, design of extensions and reinforcements to the H.V. and M.V. systems, mainly underground, and layout and specifications of plant and equipment. The City of Birmingham is presently being extensively redeveloped and the work will be interesting and varied. The Board operates a Management Development Scheme and offers good prospects of advancement to suitable staff. Salaries will be according to qualifications and experience, within the following ranges:

Second Assistant Engineer, £1,270/£1,360 or £1,360/£1,450 per annum (N.J.B. Grades M.8 or 7).

Third Assistant Engineer, £1,025/£1,085, £1,095/£1,170 or £1,195/£1,270 per annum (N.J.B. Grades M.11, 10 or 9).

Fourth Assistant Engineer, £910/£955 or £965/£1,025 per annum (N.J.B. Grades M.13 or 12).

Apply, by letter, stating age, education, experience, present position and salary to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

### Central Gloucestershire Sub-Area

THIRD ASSISTANT ENGINEERS (CONTROL) (TWO) (HEADQUARTERS)

The successful applicants will be required to take full shift responsibilities for all functions associated with high voltage system control. Applicants should have had sound technical training together with experience of switching operations and maintenance work on H.V. distribution equipment. Technical qualifications desirable.

Salary: £965/£1,025 per annum (N.J.B. Grade K.10), plus 10% shift enhancement. Apply, by letter, within 14 days, stating age, experience and qualifications, present position and salary to Mr S. Raybould, Sub-Area Manager, Midlands Electricity Board, Eastern Ave, Gloucester.

### Worcester and District Sub-Area

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER
(REDDITCH/BROMSGROVE)

Applicants should have had a sound technical training and wide practical experience in estimating and contracting work. A good knowledge of electrical installation practice is required. The successful applicant will be required to assist in all branches of commercial work, including advising consumers on domestic, commercial and industrial equipment and rural development. Salary: £860/£905 per annum (N.J.B. Grade F.8). (It is expected that there will be a change in classification to Class G as from 1 April, 1960.) Apply, by letter, within 14 day, stating age, experience, present position and salary to District Manager, Midlands Electricity Board, Windsor Rd, Redditch.

F. W. CATER,
Secretary.
(R 222)

## IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY

APPLICATIONS are invited for appointment as LECTURER in Electric Traction in the Department of Electrical Engineering, to work with a Reader to establish a new section for post-graduate teaching and research in this subject. Salary in range £1,050 x £50—£1,400 x £75—£1,850 plus £60 London Allowance, family allowances and F.S.S.U. membership. Appointment will be in upper range for candidate with appropriate qualifications. Thorough knowledge of machines and rectifiers is of more importance than extensive experience in traction. Applications to Head of Department of Electrical Engineering, Imperial College of Science and Technology, Prince Consort Rd, London S.W.7, by 8 July, 1960. (R 206)

## CENTRAL ELECTRICITY GENERATING BOARD

### East Midlands Division

CLERK OF WORKS
TRANSMISSION CONSTRUCTION DEPARTMENT
VACANCY No. 161/60.

APPLICANTS will be required to supervise the construction of overhead lines and should have extensive experience in all phases of the construction of steel tower overhead lines using SCA conductor.

Salary will be in accordance with Grade 4 (£795/£870 per annum) of the National Joint Council Agreement.

Closing date for receipt of applications: 1 July, 1960.

This appointment will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated.

O. S. WOODS,
Divisional Controller.
(R 213)

## SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD

### Regional Engineer's Department

APPLICATIONS are invited for appointments on the permanent staff of the Board generally in accordance with the Whitley Council conditions of service.

The Board is undertaking a considerable programme of hospital development and the persons appointed will be engaged on varied and interesting work.

ENGINEERING GENERAL GRADE

Applicants should be (i) Corporate Members of the Institution of Electrical Engineers or (ii) have passed the Institution's examination, and be Graduate Members, and be experienced in the preparation of specifications, drawings and estimates for electrical installations in hospitals and large public buildings.

Salary scale on or after 1 July, 1960: £910 x £35(1) x £40(2) x £45(5) x £50(7)—£1,600. Bar at £1,205 for graduate members of the Institution. Corporate members will commence at £1,160 p.a. London Weighting allowance of £40/£50 p.a., payable in addition.

Applications stating age, qualifications, experience, present appointment and salary, together with the names and addresses of three referees, should be sent to the undersigned at 40 Eastbourne Terr, London W.2, by not later than 9 July.

E. G. BRAITHWAITE,
Secretary.
(R 223)

## CENTRAL ELECTRICITY GENERATING BOARD

### South Wales Division

APPLICATIONS invited for the following superannuable N.J.B. appointments in the South Wales Division:

LLYNFI POWER STATION
NR. BRIDGEND, GLAM.

VACANCY No. 159/ET/60.

ASSISTANT SHIFT CHARGE ENGINEER

Salary: G.9, £860/£905 per annum, plus 10% shift enhancement.

UPPER BOAT POWER STATION
PONTYPRIDD, GLAM.

VACANCY No. 160/ET/60.

SHIFT CHARGE ENGINEER

Salary: H.7, £1,025/£1,085 per annum, plus 10% shift enhancement.

Applicants should possess H.N.C. or equivalent and should have had operating experience in a Power Station.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 8 July, 1960. (R 224)

## LEEDS COLLEGE OF TECHNOLOGY

### Calverley Street, Leeds 1

Principal: C. Chew, M.SC.TECH., F.R.I.C.

APPLICATIONS are invited for the following posts, duties to commence on 1 Sept. next, or as soon as possible thereafter:

(a) SENIOR LECTURER IN ELECTRICAL ENGINEERING. Applicants should hold a good degree in the subject with industrial or research experience in electronics and telecommunications.

(b) LECTURER IN ELECTRICAL ENGINEERING. Applicants should possess a good degree or equivalent qualifications in the subject together with industrial or research experience.

Burnham Technical Salary Scales:
Senior Lecturer: £1,550 x £50—£1,750.
Lecturer: £1,370 x £35—£1,550.

Allowance for experience of comparable responsibility may be made in the commencing salary.

Further particulars and forms of applications, to be returned as quickly as possible, may be obtained by sending a stamped addressed foolscap envelope to the Principal of the College.

GEORGE TAYLOR,
Chief Education Officer.
Education Department,
Calverley St,
Leeds 1. (R 195)

## GOVERNMENT OF HONG KONG

ELECTRICAL/MECHANICAL ENGINEER
PUBLIC WORKS DEPARTMENT

DUTIES comprise the design, estimation, installation, operation and maintenance of air conditioning installations in large buildings including refrigeration plant.

Permanent and pensionable appointment. Salary according to experience within the range £1,650/£2,865. Quarters at low rent. Free passages. Generous leave.

Candidates must be under 35 years and A.M.I.E.E. or A.M.I.Mech.E., with at least three years' post qualification experience in the refrigeration industry.

Write Director of Recruitment, Colonial Office, London S.W.1, giving full names, age, qualifications and experience, quoting BCD 112/51/033/D10. (R 226)

## CENTRAL ELECTRICITY GENERATING BOARD

### Eastern Division

APPLICATIONS are invited for the following appointments in the Divisional Electrical Department:

FOURTH ASSISTANT ENGINEER
FINCHLEY (WEST) TECHNICAL SECTION
(S.V. No. 1332)

Salary: N.J.B. Class AX/DX, Grade 8, £775 x £25—£910/£985 per annum inclusive of London Weighting.

Previous experience in the commissioning of high voltage electrical apparatus and associated protective gear would be an advantage.

Applicants should possess a Higher National Certificate in electrical engineering or its equivalent.

The applicant appointed will be required to reside in the Barnet-Watford-Harrow area.

THIRD ASSISTANT ENGINEER
(CIVIL AND MECHANICAL)
DIVISIONAL HEADQUARTERS
(COCKFOSTERS, NORTH LONDON)
(S.V. No. 1359)

Salary: N.J.B. Class AX/DX, Grade 6, £975 x £25—£1,100/£1,190 per annum inclusive of London Weighting.

The successful applicant will be required to assist in the supervision of Contracts for the installation of overhead lines constructed on steel towers and for foundations and site works for transmission substations, and should have received the appropriate training for such duties.

Applications, quoting the appropriate Reference S.V. No., stating age, qualifications, experience and present position should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, to arrive not later than 2 July, 1960. (R 212)

## THE NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

CHIEF ENGINEER'S DEPARTMENT

THIRD ASSISTANT ENGINEER, Technical Section, Carliol Hse.

Applicants should have had experience in testing, commissioning and maintenance of electrical measuring instruments and protective equipment. Knowledge of the design of electronic devices and circuits will be an advantage.

Salary: Schedule B, Grade 5, or 6 according to qualifications, £925/£1,320. N.J.B. Conditions of Service.

TWO SENIOR DRAUGHTSMEN at Carliol Hse.

Applicants should have experience in preparation of schematic and electrical layout drawings for proposed 132 kV substations, and the preparation of route plans for 132 kV overhead lines. Knowledge of building construction would be an advantage. Candidates should be neat and capable draughtsmen and possess an O.N.C. in Electrical Engineering or equivalent qualification.

Salary: Schedule D, Grade 5, £790/£890.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box 117, Carliol Hse, Newcastle upon Tyne, within ten days of the appearance of this advertisement. (R 239)

## YORKSHIRE ELECTRICITY BOARD

### No. 1 (Bradford) Sub-Area

SUB-AREA SECRETARY

APPLICANTS should have had wide administrative experience in a senior appointment in the Electricity Supply Industry. Membership of an appropriate professional body will be an advantage.

Salary: N.J.M. and H.E. Class C, Scale 5, £1,940/£2,140 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford, not later than 8 July, 1960.

### No. 4 (Leeds) Sub-Area

SENIOR DRAUGHTSMAN (CIVIL)

Applicants should have had a recognised technical training and have had experience in the design and detailing of new buildings and in the conversion of existing buildings.

Experience in the preparation of Bills of Quantities and Estimates is essential and the ability to design simple reinforced concrete and/or steel structures would be an advantage.

Salary: N.J.B. Schedule D, Grade 5, £790 x £20—£890 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, Nr. Leeds, not later than 8 July, 1960.

### No. 3 (Sheffield) Sub-Area

SHEFFIELD DISTRICT

SENIOR SALES REPRESENTATIVE

Applicants should have had previous sales experience in the Electricity Supply Industry and should be competent to control representatives engaged on matters connected with supply, tariffs, apparatus, and sales to domestic, small commercial and industrial consumers. The possession of the E.D.A. Salesmanship Diploma will be an advantage.

The successful applicant will be based on Sheffield, but will be required to work throughout the Sub-Area, as occasion demands; in addition, he may be required to undertake duties in the Service Centre.

Salary: N.J.C. Grade 3, £720 x £20—£780 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St, Sheffield 1, not later than 8 July, 1960. (R 228)

## CENTRAL ELECTRICITY GENERATING BOARD

### South Eastern Division

VACANCY No. 138/60.

THIRD ASSISTANT ENGINEER (OPERATION AND MAINTENANCE, TRANSMISSION) is required for the District which is based at Northfleet Power Station. Candidates must possess H.N.C. in Electrical Engineering or equivalent qualification, and have had experience in the operation and maintenance of overhead lines, transformers and switchgear up to and including 275 kV. Experience in the direction of labour is essential.

Salary on new Common Scale, Class AX, Grade 6, £1,140/£1,355 per annum, including London Allowance.

Applications giving age, details of experience, qualifications, etc., should be sent to the Personnel Officer, Central Electricity Hse, Lower Ham Rd, Kingston upon Thames, Surrey, to arrive by 6 July, 1960. (R 256)

## THE COUNTY BOROUGH OF CROYDON

### Education Committee

invite applications from suitably qualified teachers for the following posts which will become tenable in September:

Croydon Technical College,
Fairfield, Croydon.

Principal: D. A. Green, M.B.E., B.SC., M.ED.

Assistants, Grade B, for the Department of Electrical Engineering.

The subjects required are mathematics, electrical installation work and radio, television and electronic servicing, and applicants are asked to say which of these they offer.

The salaries for the posts are in accordance with the Burnham Technical Scale of £700/£1,150 per annum, plus London Area Allowance, with appropriate allowances and increments for degree, training and previous teaching and industrial experience.

Further particulars and forms of application may be obtained from the Chief Education Officer, Education Office, Katharine St, Croydon, and should be returned to the Principal within 14 days of the appearance of this advertisement. (R 196)

## LONDON ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEERS (2)

APPLICATIONS are invited for the above position. Initially the successful candidate will be located at Penrose St, S.E.17.

Applicants should have a sound technical education to the standard of the Higher National Certificate, and have completed a recognised period of training in the Electricity Industry, or have equivalent experience.

Pending determination as to the grading and salary applicable to the post within the National Joint Board Agreement, the provisional minimum salary will be £610 per annum rising to £745 per annum, inclusive of London Allowance.

Application form obtainable from Personnel Officer, 46 New Broad St, E.C.2. Please quote ref. PER/V/2972/T. (R 233)

## CENTRAL ELECTRICITY GENERATING BOARD

### South Eastern Division

CROYDON "B" POWER STATION

VACANCY No. 135/60.

ASSISTANT SHIFT CHARGE ENGINEER

CANDIDATES for this position should have had a sound practical training, be experienced in the operation of modern power station plant, and preferably have undertaken technical training to Higher National Certificate level.

Salary within N.J.B. Class J, Grade 9, £1,111 10s/£1,177 10s per annum, including shift and London Allowances.

Applications, giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Croydon "B" Generating Station, Beddington Farm Rd, Croydon, Surrey, to arrive by 30 June, 1960.

W. H. DUNKLEY,
Divisional Controller.
(R 197)

## NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

THIRD ASSISTANT ENGINEER
(O. AND M. TRANSMISSION)

APPLICATIONS are invited for the above appointment in the Chief Electrical and Mechanical Engineer's Department in Edinburgh. Candidates should have experience in the construction, operation and maintenance of overhead lines and substations. The principal duty will consist of supervising maintenance arrangements for the 132 kV network, but knowledge of other voltages will be an advantage.

Salary commencing at a point within the range £1,090 x £1,305 (N.J.B. Schedule B, Class AX, Grade 6). Superannuation scheme.

Application form obtainable from the Secretary, 16 Rothesay Ter, Edinburgh 3, should be returned by 16 July, 1960. (R 232)

## THE SOUTH WALES ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER

APPLICATIONS are invited for the position of General Assistant Engineer in the Barry District of the Cardiff and East Central Area of the Board.

Preference will be given to Engineers possessing the Higher National Certificate in Electrical Engineering.

The salary for the position will be in accordance with Class F, Grade 11 (£710/£755 per annum) of the National Joint Board Schedule for the Electricity Supply Industry.

Applications stating age, present position, present salary, qualifications and experience should be addressed to C. L. Townsend, ASSOCIATE I.E.E., Manager, Cardiff and East Central Area, 445-447 Cowbridge Rd East, Cardiff, so as to arrive not later than Saturday, 9 July, 1960.

Envelopes should be endorsed "General Assistant Engineer—130/60."

R. G. WILLIAMS,
Secretary.
(R 253)

## CENTRAL ELECTRICITY GENERATING BOARD

### Midlands Division

ENGINEERING DRAUGHTSMAN required in the Electrical Engineer's Drawing Office at Divisional Headquarters, Birmingham.

Applicants should have suitable technical training and be capable, under supervision, of preparing detail drawings in connection with the construction of High Voltage Substations.

Salary will be in accordance with Grade 6 of Schedule D of the National Joint Board Agreement, within the range £620/£740 per annum.

Applications, quoting vacancy number 144/60MD, should be submitted on the official form AE6, which may be obtained from the Establishments Officer, Central Electricity Generating Board, Midlands Division, 53 Wake Green Rd, Moseley, Birmingham 13. Closing date for receipt of applications 1 July, 1960. (R 210)

## SOUTHERN ELECTRICITY BOARD

DISTRICT ENGINEER

READING District of No. 2 (Newbury) Sub-Area. Salary N.J.B. Class J, Grade 2 (£1,600 x £35—£1,705 per annum). N.J.B. Conditions of Service.

Applicants should have had wide experience in the planning, construction, maintenance and operation of distribution systems both underground and overhead and involving substations, working at voltages up to 33,000. They should have had a full technical training and the possession of recognised qualifications in electrical engineering would be an advantage.

The successful candidate will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting Z.1194, not later than 4 July, 1960. (R 236)

**Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2**

**CENTRAL ELECTRICITY GENERATING BOARD**

*Southern, South Western and South Wales Region*

*RESEARCH & DEVELOPMENT DEPARTMENT*

**PORTISHEAD SOMERSET**

# ELECTRICAL ENGINEER

Applications are invited for the above appointment based at new laboratories at Portishead.

The work involves laboratory and site investigations of technical problems occurring on the Board's Generation and Main Transmission System including the development of electrical equipment for full scale and test rig investigations into burner design, thermal stresses, etc.

Applicants should possess qualifications leading to corporate membership of the I.E.E. Previous experience in generation and transmission of electricity together with research experience and a knowledge of electronics would be an advantage.

**The salary for this post will be within the range**

**£735/£1,170 per annum**

according to capabilities and experience.

*Application forms AE6/ACT obtainable from the Regional Secretary,*

**CENTRAL ELECTRICITY GENERATING BOARD,**

**Southern, South Western and South Wales Region,**

**1 Eaton Crescent, Clifton, Bristol 8,**

*should be completed and returned so as to reach him by Friday, 8 July, 1960, accompanied by any additional information thought necessary.*

(R 199)

## COUNTY BOROUGH OF PRESTON

APPLICATIONS are invited for the post of TECHNICAL ASSISTANT in the Public Lighting and Electrical Section of the Borough Engineer and Surveyor's Department: salary in accordance with A.P.T.I., £610, rising to £765 per annum.

Candidates should have had approved training and hold the National Certificate, or equivalent qualification, in Electrical Engineering. Experience in the design, installation and maintenance of electrical wiring and equipment for street lighting, public buildings, schools and houses, and in the preparation of specifications and estimates, therefore, is desirable.

Forms of application can be obtained from the undersigned, to whom they must be returned by first post, Monday, 11 July, 1960.

W. E. E. LOCKLEY,
Town Clerk.

Municipal Bldg.
Preston. (R 230)

## CENTRAL ELECTRICITY GENERATING BOARD

**London Division**

APPLICATIONS invited for following superannuable post. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT ENGINEER (OPERATION)
STEPNEY POWER STATION
Vacancy No. 60/447.

Sound technical training with experience of power station plant operation, preferably P.F. fired. Duties include relief for other N.J.B. Shift staff. Salary: Class F, Grade 9, £865 plus £90 shift per annum.

Applications, quoting vacancy No. to (or on form from) Personnel Officer, Central Electricity Generating Board, London Division, P.O. Box 136, London W.1, by 4 July, 1960. (R 205)

## NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE

**Burton Street, Nottingham**

Principal: D. A. R. Clark, M.SC.(TECH.), M.I.MECH.E.

APPLICATIONS are invited for the following vacancy:

ASSISTANT LECTURER GRADE B IN ELECTRICAL ENGINEERING

Salary in accordance with the Burnham Technical Scale as follows:

£700 x £27 10s—£1,150 per annum, plus additions for qualifications and training. Commencing salary according to previous experience.

Research encouraged. Facilities and equipment available.

Further particulars and form of application may be obtained from the Principal, to whom completed forms should be returned not later than 8 July, 1960. (R 225)

## MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

DRAUGHTSMAN (ARCHITECTURAL)

REQUIRED in the Engineering Department at the Headquarters of the Board, Electricity Hse, Love La, Liverpool 3.

Applicants should be 21 years of age or over, have served a building apprenticeship or received architectural training, and have obtained the O.N.C. (Building) or equivalent. Experience in the preparation of building construction drawings would be an advantage but is not essential.

The salary payable will be within the range £620/£740 per annum (N.J.B. Schedule D, Grade 6), with prospects of progress to Grade 5 (£790/£890 per annum).

Appointment subject to medical examination. Pension scheme.

Applications, by letter to the Establishments Officer at the above address, should be received not later than 4 July, 1960. (R 227)

## THE NORTH EASTERN ELECTRICITY BOARD

CHIEF COMMERCIAL OFFICER'S DEPARTMENT

APPLICATIONS are invited for a COMMERCIAL STAFF TRAINER in the Chief Commercial Officer's Department at Area Board Headquarters, Newcastle upon Tyne.

Applicants should have considerable electricity service centre experience or a wide experience in sales training and have the ability to instruct. The person appointed will be expected to assist in the administrative arrangements and development of sales training courses and to give instruction in sales technique to Board's employees attending basic courses in sales training and to employees attending more specialised courses on different types of appliances. The possession of O.N.C. in Electrical Engineering or a City and Guilds Installation Certificate would be an advantage. The salary will be on Grade 7, N.J.C. (£1,070/£1,160) or Grade 6, AX1/DX, Schedule B, N.J.B. Agreement (£925/£1,140) according to qualifications and experience.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle upon Tyne, within ten days of the appearance of this advertisement. (R 240)

## THE EAST MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited from suitably qualified persons for the following appointments:

**Northamptonshire Sub-Area**

FOURTH ASSISTANT ENGINEER
(SHIFT OPERATIONS)
Vacancy No. 79/60.

Salary: N.J.B. Class K, Grade 12, £860 x £15—£905 per annum plus shift allowance.

Candidates should have had experience of switching operations on a high-voltage distribution system, preferably including both Urban and Rural networks. Experience in the issue and cancellation of Permits to Work under the C.E. Safety Rules, or acting as Control Engineer for part of a high-voltage system, would be an advantage.

Applications giving details of experience, etc., should be addressed to the Manager, Northamptonshire Sub-Area, 25 Bridge St, Northampton, within 14 days of the date of this advertisement.

KETTERING DISTRICT
JOINTER (EXTRA HIGH TENSION)
FITTER (ELECTRICAL)

Present rate of pay 5s 1¾d per hour. N.J.I.C. conditions. 42-hour, 5-day week. Holiday, sick pay and optional superannuation scheme.

Applications should be sent to the District Engineer, Kettering District, Rockingham Rd, Kettering, Northants, within 14 days of the date of this advertisement. (R 231)

## NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

**Northern Area**

APPLICATIONS are invited for the post of FIRST ASSISTANT DISTRICT ENGINEER in the Lewis District. District Office is in Stornoway where the successful candidate is required to operate.

The district is predominantly rural embracing the islands in the Outer Hebrides, and the post provides work of an interesting and varied nature which at times necessitates travel by sea and air.

Applicants should have experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution networks, substation plant and ancillary apparatus. Minimum technical requirements: Ordinary National Certificate in Electrical Engineering. Superannuation scheme applicable. Salary: N.J.B. Class C, Grade 5, £860 x £15—£905.

Application forms for the above posts may be obtained from the Area Manager, Church St, Dingwall, and should be returned duly completed by Monday, 18 July, 1960. (R 254)

## SOUTH EASTERN ELECTRICITY BOARD

INSTALLATION INSPECTOR
CENTRAL SUSSEX DISTRICT

WAGES 5s. 6½d per hour for 42-hour, 5-day week, under N.J.I.C. Agreement. Applicants should have sound knowledge of current regulations issued by the Institution of Electrical Engineers and be conversant with the Electricity Supply Regulations, in relation to consumers' installations. Superannuable.

The successful applicant will be based at Haywards Heath, but will be required to work anywhere in the district.

Applications, quoting ET and naming two referees, to District Manager, Seeboard, Electra Hse, Church Rd, Haywards Heath, Sussex, by 4 July, 1960.

E.H.T. JOINTERS
HERNE BAY/CANTERBURY DISTRICT

Wages 5s 1½d per hour for a 42-hour, 5-day week, under N.J.I.C. Agreement.

Applications, quoting ET and naming two referees, to the Joint District Managers, Seeboard, 65 Mortimer St, Herne Bay, by 4 July, 1960.

ASSISTANT DISTRICT ENGINEER
WORTHING DISTRICT

Salary £860/£905 per annum. N.J.B. Class F, Grade 8. Superannuable. Applicants should be suitably qualified and have had training and experience in the construction, operation and maintenance of underground and overhead distribution systems up to 33 kV. Rented housing accommodation may be available.

Applications, quoting ET and naming two referees, to District Manager, Seeboard, 56 Chapel Rd, Worthing, by 6 July, 1960.

ASSISTANT DISTRICT ENGINEER
LEWES DISTRICT

Salary £790/£835 per annum under N.J.B. Class E, Grade 8. Superannuable. Applications should be suitably qualified and have had training and experience in the construction, operation and maintenance of underground and overhead distribution systems up to 33 kV.

Applications, quoting ET and naming two referees, to District Manager, Seeboard, 80/81 High St, Lewes, Sussex, by 6 July, 1960.

ASSISTANT DISTRICT ENGINEER
WEALD DISTRICT

Salary £765 x £15—£810 under N.J.B. Class E, Grade 9. Superannuable. The successful applicant will be required to assist in construction and maintenance of H.V. and L.V. overhead and underground mains and substations. Technical qualifications desirable.

Applications, quoting ET and naming two referees, to District Manager, Seeboard, Fairview, Highgate, Hawkhurst, Kent, by 6 July, 1960.

ASSISTANT DISTRICT ENGINEER
SEVENOAKS AND REIGATE DISTRICT

Salary £815 x £15—£860 per annum under N.J.B. Class G, Grade 10, according to qualifications, experience and ability. Superannuable. Applicants should be suitably qualified and have had training and experience in the construction, operation and maintenance of underground and overhead distribution systems, up to 11 kV. Suitable accommodation may be available and consideration will be given to a car allowance.

Applications, quoting ET and naming two referees, to District Manager, Seeboard, Electric Hse, West Hill, Oxted, Surrey, by 6 July, 1960.

ELECTRICAL FITTERS
HASTINGS AND DISTRICT

Wages 5s 1½d per hour for 42-hour, 5-day week under N.J.I.C. Agreement. The duties will include the erection, connection and maintenance of switchgear and transformers throughout the District. Superannuable.

Applications, quoting ET and naming two referees, on forms from District Manager, Seeboard. 12/13 York Bldgs, Hastings, by 4 July, 1960.

ELECTRICAL FITTER
BRIGHTON AND HOVE DISTRICT

Wages 5s 1½d per hour for a 42-hour, 5-day week under N.J.I.C. Agreement. Experience in the erection and maintenance of H.V. and L.V. switchgear and transformers

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is essential. Contributory pension scheme optional.

Applications, quoting ET and naming two referees, to District Manager, Seeboard, Electric Hse, Castle Sq, Brighton 1, by 4 July, 1960.

FOURTH ASSISTANT ENGINEER
(OPERATION AND MAINTENANCE)
SURREY SUB-AREA HEADQUARTERS
DORKING

Salary £860/£905 p.a. in accordance with N.J.B., Class L, Grade 13. Superannuable. Applicants of at least H.N.C. standard should have had a sound training in electrical distribution. Duties will chiefly consist of assisting in plant maintenance and the testing and commissioning of system protection. A knowledge of, or interest in, the latter would be an advantage.

Applications, quoting ET and naming two referees, on forms from Surrey Manager, Seeboard, Rough Rew, Ridgeway Rd, Dorking, Surrey, by 6 July, 1960.

ASSISTANT DISTRICT COMMERCIAL ENGINEER
WOKING DISTRICT

Salary under N.J.B. Class F, Grade 8, £860/£905 per annum. Superannuable. Applicants should be technically trained and be conversant with the commercial activities of a District. Initially the principal duties will be to control the work in connection with a large voltage standardisation programme.

Applications, quoting ET and naming two referees, on forms from District Manager, Seeboard, 4 Chobham Rd, Woking, by 6 July, 1960.

GEORGE WRAY,
Secretary.
(R 235)

## ISLE OF WIGHT COUNTY COUNCIL

ISLE OF WIGHT TECHNICAL COLLEGE

APPLICATIONS are invited for the full-time appointment of a LECTURER in Electrical Engineering in the Department of Engineering. The teacher appointed will be required to teach electrical subjects for National Certificate and City and Guilds courses.

Qualifications should include Corporate Membership of the Institution of Electrical Engineers and a good industrial experience.

Salary will be in accordance with the Lecturers' Scale of the Burnham Report.

Further particulars and forms of application (stamped addressed envelope) may be obtained from the Registrar, Isle of Wight, Technical College, Hunnyhill, Newport, Isle of Wight, to whom they should be returned within two weeks of the appearance of this advertisement.

A. L. HUTCHINSON,
County Education Officer.
(R 257)

## EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

**Area Headquarters,**
WHERSTEAD, IPSWICH
154/60.R.
SENIOR ASSISTANT ENGINEER
(COMMERCIAL)

Applications are invited for the above appointment in the Tariffs and Economics Section of the Chief Commercial Officer's Department.

Candidates should have a knowledge of the economics of the Electricity Supply Industry and should have wide general experience of Electricity Tariffs. Experience in the preparation and negotiation of terms for supplies to Industrial Consumers is desirable, as is a knowledge of Statistical Methods. Appropriate engineering or economic qualifications would be an advantage.

Salary: At present N.J.B. Class AX/EX, Grade 3 (£1,365/£1,630). From 1 July, 1960, the salary range will be £1,365/£1,730.

Apply by letter to the Chief Commercial Officer, Eastern Electricity Board, P.O. Box 40, Wherstead, Ipswich, Suffolk, by 8 July, 1960.

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**Norfolk Sub-Area**
KING'S LYNN AND WESTERN DISTRICT
SECOND ASSISTANT ENGINEER
155/60.R.

Applicants should have had a sound technical training and considerable experience in the construction, operation and maintenance of overhead and underground distribution, operation and maintenance of overhead and underground distribution systems (including substations) at voltages up to and including 33 kV.

Salary: N.J.B. Class F, Grade 7 (£910/£955).

Apply by letter to the Manager, King's Lynn and Western District, Eastern Electricity Board, Gaywood Bridge, Wootton Rd, King's Lynn, by 8 July, 1960.

**Northmet Sub-Area**
SUB-AREA HEADQUARTERS
SOUTHGATE N.14
151/60.R.
GENERAL ASSISTANT
DEVELOPMENT SECTION
(Ref. 983)

Candidates should have had a good general and technical education and possess the Higher National Certificate or equivalent qualifications. Previous experience in planning and development work will be an advantage.

Salary: N.J.B. Grade 18/14 within a range of £750/£1,005 inclusive of London Allowance, the grade to be dependent upon qualifications and experience.

Apply by letter to the Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet Hse, Southgate, London N.14, by 4 July, 1960.

**Northmet Sub-Area**
HORNSEY DISTRICT
152/60.R.
FOURTH ASSISTANT ENGINEER
(Ref. 950)

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary: N.J.B. Class G, Grade 11 (£765/£810) plus London Allowance.

Apply by letter to C. Bradley, M.I.E.E., Manager, Hornsey District, Eastern Electricity Board, The Broadway, Crouch End, Hornsey, London N.8, by 4 July, 1960.
(R 238)

## SOUTHERN ELECTRICITY BOARD

ASSISTANT ENGINEER
(MAINTENANCE AND OPERATION)

HESTON District of No. 1 (Southall) Sub-Area. Salary N.J.B. Class G, Grade 9 (£910/£955 per annum, inclusive of London Allowance). N.J.B. Conditions of Service.

The duties of the post will be to assist with the maintenance and operation of switchgear, transformers, auxiliary gear and underground cables up to and including 11 kV. The appointment will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, 2/6 Windmill La, Southall, Middlesex, and returned to him, quoting Z.1197, not later than 4 July, 1960.

ASSISTANT ENGINEER
(MAINTENANCE AND OPERATION)

Portsmouth District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class H, Grade 9 (£910/£955 per annum), with N.J.B. Conditions of Service, but present trends indicate that the District may be reclassified to Class J with effect from 1 April, 1960 (£965/£1,025 per annum).

The duties of the post will be to assist with the maintenance and operation of H.V. and L.V. distribution mains and substations and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton La, Cosham, Portsmouth, and returned to him, quoting Z.1212, not later than 4 July, 1960.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. (R 237)

# CENTRAL ELECTRICITY GENERATING BOARD

## PLANNING DEPARTMENT

### Headquarters, London, S.E.1

## SENIOR ASSISTANT ENGINEER

## (HYDRO-ELECTRIC)

**required in the Hydro, Industrial and District Heating Section of the Station Planning and Development Branch.**

The Section is concerned with the planning of new hydro-electric generating plant in England and Wales. It is responsible for the investigation and selection of sites for hydro-electric and related projects including their economic assessment and subsequently their evolution in principle. It is also responsible for the negotiations for statutory and other consents.

**The engineer appointed to this position would be responsible to the Hydro, Industrial and District Heating Engineer.**

Candidates should possess an Honours degree or the requisite qualifications for corporate membership for the Institutions of Civil, Mechanical or Electrical Engineers. A sound engineering or scientific background in hydro-electric work is essential. It will also be an advantage if candidates have been engaged in the preparation of initial project reports and estimates for such schemes and/or have experience in hydro-electric construction.

**Salary within the range £1,590/£1,940 p.a.**

**Applications stating age, qualifications, experience, present position and salary, to**

**THE PERSONNEL OFFICER,**
**24/30 HOLBORN, LONDON E.C.1,**

**by 4 July. Envelopes should be marked "Confidential. Ref. ET/220."** (R 207)

AN opportunity exists for a QUALIFIED ELECTRICAL ENGINEER of between 25 and 35 years old to join the editorial staff of the ELECTRICAL TIMES. Some evidence of writing ability desirable, but training in journalism will be given to the man appointed. The post offers interesting work and excellent opportunities to an engineer aiming at a broad knowledge of the electrical industry. Initial salary according to age. The position is pensionable and carries life insurance according to period of service. —Write The Editor, Sardinia House, Sardinia St, W.C.2.

ASSISTANT ELECTRICAL ENGINEER required by national newspaper. Age 25/26. Electrical apprenticeship and Higher National. Must be first-class electrical draughtsman. Good prospects.—Box No. 7879, Electrical Times. (R 83)

CROMPTON PARKINSON LTD. require a SENIOR TRANSFORMER DESIGNER for their Hayes Works, Middx. Applicants should have degree or H.N.C. and preferably some years' experience with transformers up to 20,000 kVA and 66 kV, with on-load tap changing gear.

Write with full particulars of age, education, qualifications and salary required to the Personnel Officer, Clayton Rd, Hayes, Middx. (R 184)

# ENGLISH ELECTRIC

## PROFESSIONAL ENGINEERING APPOINTMENTS

are available with the Switchgear Organisation of this Group on a range of Application and Contract Engineering duties.

Experience in manufacture, power generation and supply or in the utilisation of electricity is sought and professional engineers are invited to apply for consideration.

A number of vacancies also exist for younger engineers with Higher National Certificate in electrical engineering and preferably having served an engineering apprenticeship, which offer opportunity for acquiring experience, scope for advancement and training as professional engineers.

All appointments are pensionable after a qualifying period.

Apply stating age, experience and qualifications to Dept. G.P.S., 336/7 Strand, London W.C.2, quoting reference ET497F. (R 201)

## CAMERON HIGHLANDS HYDRO–ELECTRIC SCHEME MALAYA

Required by Consulting Engineers for site construction staff, an engineer with experience of foundations for light structures in difficult ground and preferably with some experience of overhead transmission line construction. The work would be almost entirely in the field and applicants should be Corporate Members of one of the senior Institutions, preferably the Institution of Civil Engineers. Two-year tour. Passages provided. Candidates should be single, although those who are married and prepared to complete the tour without their family will be considered. Concessionary housing, free medical attention and transport allowance. Salary not less than £3,290 per annum.

Applications should be made in writing within 14 days of the publication of this advertisement, giving full details of previous experience to:

**Preece, Cardew and Rider,**
**8, 10 and 12 Queen Anne's Gate,**
**London, S.W.1.**
(R 208)

CHIEF DESIGN AND DEVELOPMENT ENGINEER required for progressive Electrical Component Manufacturing Company. Full knowledge of RCS, BSI, CEE and CSA specifications essential; experience in switch and other small component design and in mass production techniques an advantage. Able to progress own work and control subordinates. Salary according to experience. Please write in first instance, giving qualifications and experience to: D. C. Phipps, Technical Director, Crater Products Ltd., Lower Guildford Rd, Knaphill, Woking, Surrey. (R 209)

CRATER PRODUCTS LTD.—Manufacturers of Rotary Switches wish to appoint a number of REPRESENTATIVES. Good connections are essential and will qualify for generous remuneration and expenses.—Apply Crater Products Ltd., Knaphill, Woking. Brookwood 2571. (R 214)

ELECTRICAL ENGINEERS with Technical Sales experience required by important commercial undertaking in Pakistan. Candidates must be Pakistani nationals, under the age of 30, and possess a good degree.—Applications in detail to Box No. 7907, Electrical Times. (R 218)

## OVERSEAS CONTRACTS ENGINEER

A vacancy exists for an experienced Electrical Engineer to take charge of installation and commissioning of Cables, Overhead Lines, Switchgear and Transformers with associated administrative work. Previous experience essential. The work would be located in Nigeria and Ghana, the initial period of this tour being 18 months. Applications giving full particulars of age, training and experience to Employment Manager, JOHNSON AND PHILLIPS LTD., Victoria Way, Charlton, S.E.7. (R 216)

# AN ELECTRICAL MAINTENANCE SUPERVISOR

*is required by*

## TEXACO TRINIDAD, INC.

***for service in TRINIDAD***

If you are keen to work in the West Indies, between the ages of 26 and 30, and have the qualifications and experience mentioned below, this vacancy might be an excellent opportunity for you.

You must have the Ordinary National Certificate in Electrical Engineering, be able to drive and have a knowledge of the electrical maintenance and installation of manual and automatic starters, motors, electrical tools, sub-station switchgear up to 6·6 kV and conduit installation practice. You must also be able to carry out this work yourself should the occasion arise.

TEXACO TRINIDAD INC. provides accommodation and services at low rentals, schooling for children up to the age of 16, leave passages to and from the U.K. every three years and an excellent pension scheme.

The salary for this position will be in accordance with age and experience but not less than £1,300 p.a.

*If you are interested in being considered for this position write in the first instance with brief particulars only to:*

**The Personnel Officer, TRINOIL (U.K.) LTD.,**
**29-30 Old Burlington St, London W.1.**

(R 258)

ELECTRICAL Manufacturer requires a SENIOR TECHNICAL REPRESENTATIVE for Northern Ireland, working from Belfast branch office. Possibility of promotion to executive status shortly. Must have good knowledge of the Electrical Industry, have first-class connections with Electrical Wholesalers, Contractors, Consulting Engineers, Industrial users, etc. Applications will be considered from all areas. The appointment necessitates residence in Belfast, but would be subject to availability of Northern Ireland employment permit if not resident at the moment in Northern Ireland. Replies, which will be treated in confidence, should state age, education, experience and salary required.—Bill Switchgear Ltd., Aston La, Perry Barr, Birmingham 20. (R 243)

ELECTRICIANS.—Fully qualified Electricians required for general maintenance and installation work on large integrated Iron and Steel Works. Excellent conditions—pension scheme in operation.—Apply to The Employment Officer, Appleby-Frodingham Steel Co., Scunthorpe, Lincs. (R 162)

ELECTRICAL ENGINEER required for Glasgow Office staff, age 23-28. Applicants (H.N.C. minimum) should have had experience in the manufacture of electrical machines. Progressive salary with non-contributory pension. Applications stating age, nationality, qualifications and experience to British Engine Boiler and Electrical Insurance Co. Ltd., 98 West George St, Glasgow C.2. (R 244)

# SALES AND CONTRACTS ENGINEERS

**Heavy Electrical Plant and Rectifiers**

## 'ENGLISH ELECTRIC' STAFFORD

Applications are invited from ELECTRICAL ENGINEERS interested in Sales and Contracts work associated with the supply of heavy electrical machines, transformers, rectifiers and their associated control equipment to heavy industry.

The posts are located in technical offices at our Stafford Works dealing with customer liaison, involving correspondence and personal contact as well as the compilation of tenders and estimates.

These opening offer an opportunity to gain valuable experience of up-to-date techniques in the field of heavy industrial applications as well as offering a secure and promising career in a stable industry.

Applicants should possess H.N.C. (E).

Assistance with accommodation will be discussed at interview.

Membership of the Staff Pension Scheme and eligibility for three weeks' holiday follow qualifying period of service.

If you would like to visit Stafford to discuss these openings please write giving details to Dept. G.P.S., Marconi House, 336/7 Strand, London W.C.2, quoting reference ET1297K. (R 202)

**BICC**

# ENGINEERS

required for the erection of steel tower and wood pole overhead transmission lines at home and overseas. Applicants should have a general engineering background up to O.N.C. level. Experience desirable but not essential. Permanent position including pension fund membership after satisfactory probation.

Applications giving full details of experience, age and qualifications to the

**STAFF OFFICER,**
**British Insulated Callender's Construction Co. Ltd.,**
**30 Leicester Sq,**
**London W.C.2.**

(R 247)

EDITORIAL ASSISTANT for Electrical Engineering Journal (London). Engineering or Science degree and some engineering experience necessary. Journalistic knowledge desirable but those with literary ability would be considered. Good prospects for advancement. Pension Scheme. Age approx. 25-30. Salary according to qualifications and experience but commencing at approx. £850/£1,000 if within the stated age range.—Box No. 7915, Electrical Times. (R252)

ELECTRICAL STAFF required by Consulting Engineer for installation design on interesting projects for Industry and Commerce. Two grades (a) ENGINEER/DRAUGHTSMAN, age 20/27; (b) JUNIOR DRAUGHTSMAN, age 16/20 (with educational facilities). Meal vouchers, five-day week. Superannuation in higher grades. State age, experience, salary required.—G. H. Buckle and Partners, 2 Harrington Gdns, London S.W.7. (R 144)

ENGINEERS for inspection of cranes and lifting plant. Must have drawing office experience of design of cranes, also National Certificate in Mechanical Engineering. Essex, Warwickshire and Liverpool areas. Starting salary £800 per annum. Non-contributory pension—permanent. Apply: Engineering Dept., General Assurance Corp. Ltd., Aldwych, London W.C.2. (R 259)

SENIOR ELECTRICIAN for first-class electrical installation work required by well-known concern. Two years overseas. Good opportunity. Write age, experience, copy references.—Box 7893, Electrical Times. (R 146)

SUPERVISING ELECTRICAL ENGINEER required. Must be fully capable of and have experience in estimating, for carrying through to finalisation all types of commercial and industrial installations. Good salary, car allowance. Permanent and progressive position. Pension and Staff Bonus Schemes. Write in confidence.—Cable Jointers Ltd., 229 High St, Acton, W.3. (R 167)

## BRITISH ENGINE BOILER & ELECTRICAL INSURANCE CO. LTD.

**Longridge House, Manchester, 4.**

Electrical Surveyors required in Ireland and Scotland. Permanent position carrying progressive salary scale £800/£1,100 and non-contributory pension. Candidates aged 26 to 32, with H.N.C. in Electrical Engineering or Grad.I.E.E. and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply stating age, qualifications and experience.

(R 246)

## WOULD YOU LIKE TO WORK IN A PEACEFUL ATMOSPHERE WITH BEAUTIFUL COUNTRY AROUND YOU?

## GROUP OF ENGINEERING COMPANIES WITH MODERN OFFICES IN HEREFORD REQUIRE:

(1) **TECHNICAL AND COMMERCIAL SALES MANAGER with experience of industrial air conditioning and refrigeration for home and export.**

(2) **DEVELOPMENT ENGINEER.**

(3) **SALES ENGINEERS.**

(4) **REFRIGERATION, MECHANICAL AND HYDRAULIC DRAUGHTSMEN AND ESTIMATORS.**

*Five-day week. Contributory pension scheme. Applications, which will be treated in strict confidence, should be made in writing stating age, experience, salary required, etc., to Managing Director, Denco Works, Hereford.*

(R 20)

SAO PAULO LIGHT S.A.—SERVICOS DE ELETRICIDADE, a Company in Brazil and a subsidiary of the Canadian corporation Brazilian Traction, Light and Power Co. Ltd., invite applications from suitably qualified men for the position of DEPUTY CHIEF of its PIRATININGA POWER STATION. The power station was completed about five years ago and is situated near Sao Paulo (population over three millions; temperate climate, 2,200 ft above sea level). The plant comprised initially 2 x 100 MW, 1,800 r.p.m. steam turbo-generator units each supplied at 850 p.s.i., 900°C by one 850,000 lb/hr oil-fired boiler and has been recently expanded by the addition of two 125 MW reheat units, 1,800 p.s.i., 1,000°F. Applicants should have sound technical knowledge and good practical experience in the administration, operation and maintenance of steam-electric power stations; should also be of strong character with an aptitude for supervision and the maintenance of harmonious labour relations. Good salary, three years' agreement with first-class passage both ways; four months' paid leave after three years' service. Written application in the first instance should be made to Mr Osborne Mitchell, General Manager, Canadian-Brazilian Services Ltd., 9/12 Cheapside, London, E.C.2. (R 165)

SPECIFICATION WRITER/ENGINEER. A vacancy exists with Sangamo Weston Ltd., at Enfield, for a Young Man having a light electrical engineering background and preferably educated to H.N.C. standard although candidates having an O.N.C. and continuing their studies will be considered. Work entails preparation of specifications of electrical measuring instruments to meet customers' requirements and liaison between development laboratories and contracts department. Write giving full details of experience, etc., to the Personnel Manager, Sangamo Weston Ltd., Cambridge Rd, Enfield, Middx. (R 200)

TENBY Electrical Accessories require a REPRESENTATIVE for London, and one for Scotland. Technical knowledge and good connection with Wholesale and Area Boards. Salary, commission, car, etc.—S. O. Bowker Ltd., 19-21 Warstone La, Birmingham 19. (R 245)

TECHNICAL REPRESENTATIVE required by substantial electrical contracting firm to call on architects, consultants, builders, etc., in Eastern Counties. Knowledge of installation work an advantage. Successful applicant will be required to ultimately live in Norfolk or Suffolk and would have opportunity of further advancement with progressive organisation. Possibility of ultimate Directorship for capable man of pleasing personality who can create goodwill and secure inquiries.—Box No. 7911, Electrical Times. (R 250)

## THE HEPWORTH IRON COMPANY LIMITED

## DEVELOPMENT ENGINEER

Minimum qualification H.N.C. in Electrical Engineering and preferably well experienced in distribution and orthodox cable jointing practices. The successful candidate will be based at Kingston upon Thames and will be given considerable scope and every opportunity to develop new techniques including the jointing of both paper and plastic insulated cables.

Applications will be treated in the strictest confidence and should be sent under confidential cover endorsed "Development Engineer" to the Sales Manager, The Hepworth Iron Company Ltd., 116 Canbury Park Road, Kingston upon Thames. (R 215)

## REPRESENTATIVE

To cover London and Southern counties for leading manufacturers of distribution equipment and accessories. The appointment calls for a first-class man of education with personality and able to pursue the Company's interests at high level with Area Electricity Boards, Consultants and Contractors. Electrical background desirable though not essential. Age 25-35. Remuneration by salary with car and full expenses. Holiday arrangements honoured. Write with brief but full details of career to:

**Box No. 7913, Electrical Times.**

(R 251)

## DEMERARA ELECTRIC COMPANY LTD

### Georgetown

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(R 248)

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(R 249)

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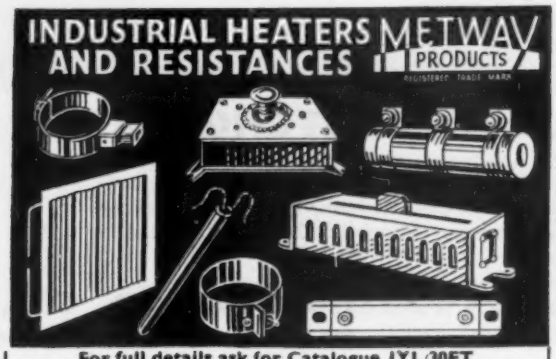

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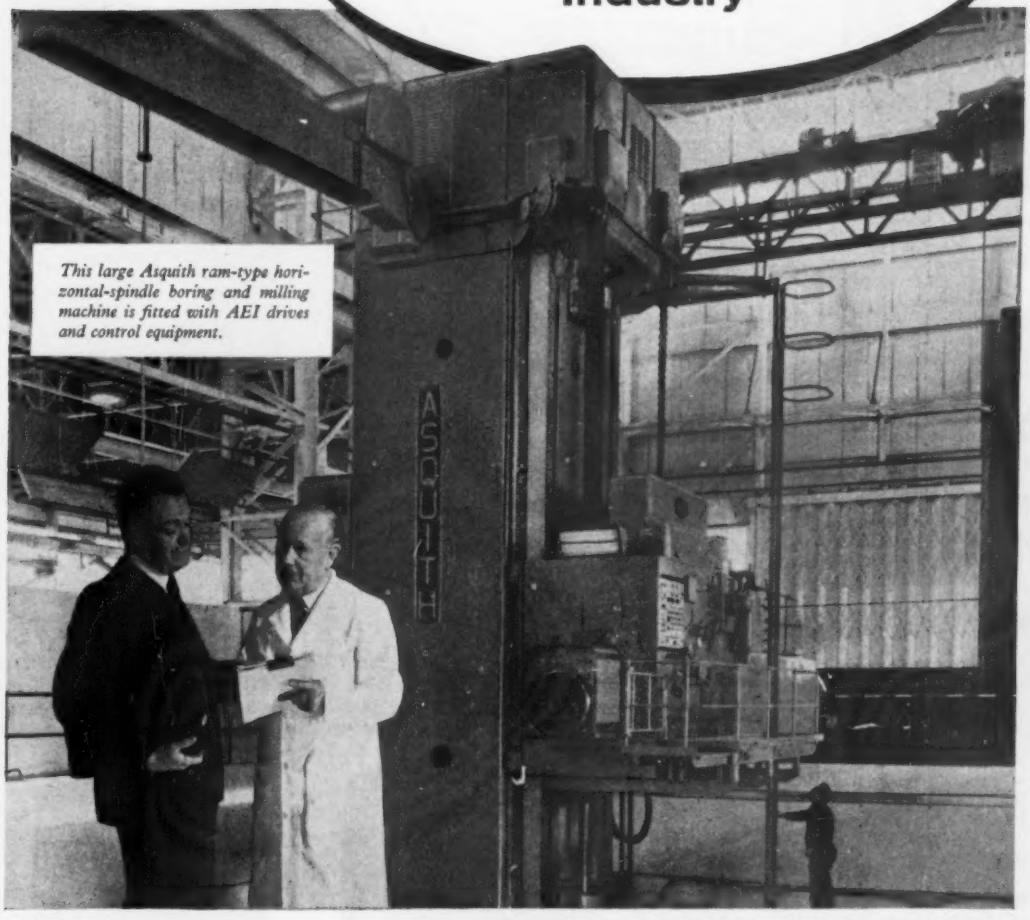


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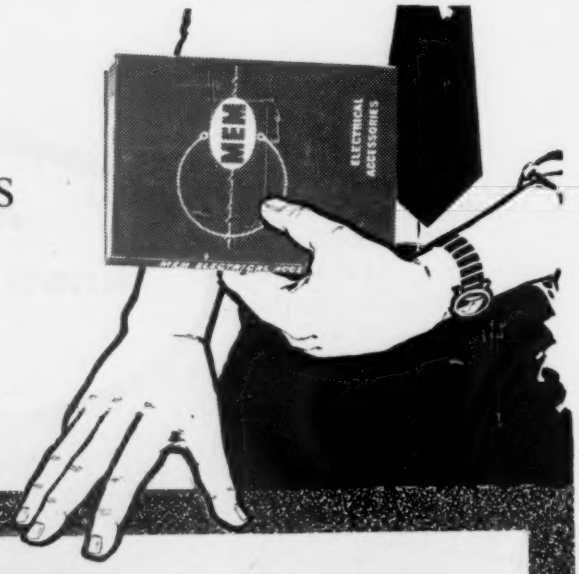


- Three outlets in one—yet only slightly larger than a single 13 amp. socket outlet.
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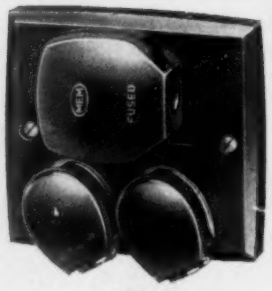
133 BOF with 133 PTB

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## MEM triple socket outlet

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- Switches are of rocker dolly type.
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- The unit can be engraved "Water Heater" when required.

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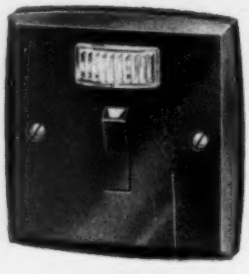

20 SBNF

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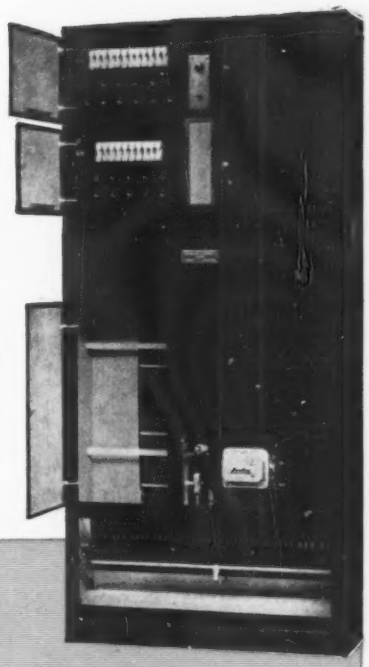
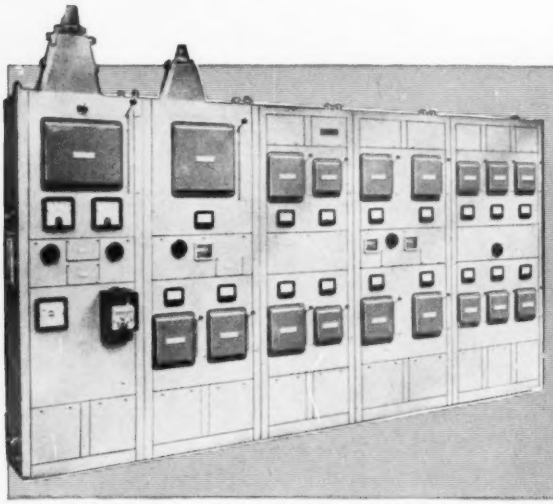
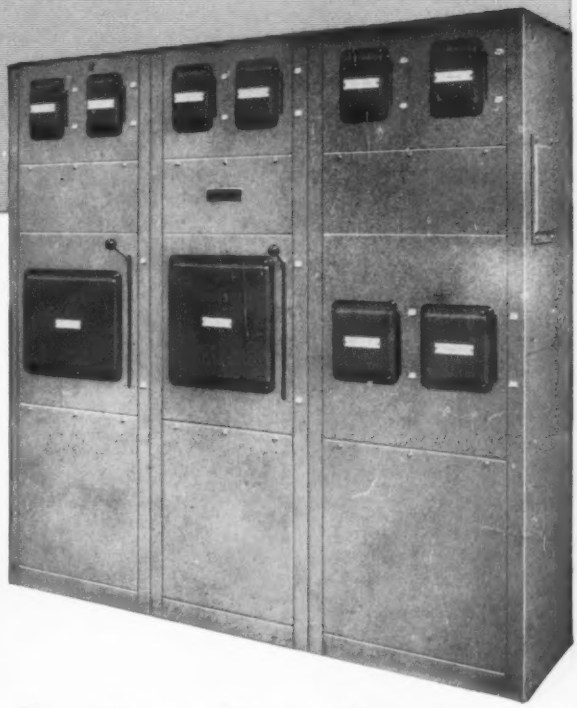


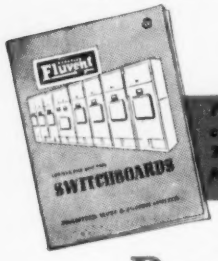
An unusual Cubicle Board (right) which provides a variety of lighting fuseboards with tumbler switch panels. It is installed in St. George's Chapel, Windsor.





Installed in a modern manufacturing undertaking, this Board (above) protects one 300 amp. eight 100 amp. and eight 60 amp. 3 phase 4 wire outgoing circuits, and the incoming Cubicle on the left is provided with a 600 amp. main switch and metering facilities.

A compact Board (right) protecting one 300 amp. and two 60 amp. 3 phase 4 wire circuits and six 30 amp. single phase and neutral circuits, all under the control of a 600 amp. T.P. and Neutral incoming main switch.




*Publication 333 illustrates and describes a selection of Cubicle and Unit Type Switchboards. A copy will be forwarded to you on request.*

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